AN 08-30CPN8-2

HANDBOOK OF OPERATING INSTRUCTIONS

for

RADIO SET AN/CPN-8

RESTRICTED

(For Official Use Only)

Approved 28 NOVEMBER 1944

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LIST OF REVISED PAGES ISSUED

NOTE: A heavy black vertical line, to the left of the text on revised pages, indicates the extent of the revision. This line is omitted where more than 50 percent of the page is revised.

½ wave Stub on Rear 5.5CM to 9 CM =

22CM to 34 CM = λ ½ wave

λ	f-MC
5.8 CM =	5,200 MC
19.0 CM =	1550 MC

20 CM = 1500 MC

30 CM = 1000 MC

Oscillator is 2J38 Sn frequencies 3249-3263 MC
Amateur Band 3300-3500 MC.

Stub Spacing on Transmission Line is 4.75 CM.
At ¼ λ

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Destruction of Abandoned Materiel in the Combat Zone

In case it should become necessary to prevent the capture of this equipment and when ordered to do so, DESTROY IT SO THAT NO PART OF IT CAN BE SALVAGED, RECOGNIZED, OR USED BY THE ENEMY. BURN ALL PAPERS AND BOOKS.

Means:—

1. Explosives, when provided.
2. Hammers, axes, sledges, machetes, or whatever heavy object is readily available.
3. Burning by means of incendiaries such as gasoline, oil, paper, or wood.
4. Grenades and shots from available arms.
5. Burying all debris or disposing of it in streams or other bodies of water, where possible and when time permits.

Procedure:—

1. Obliterate all identifying marks. Destroy nameplates and circuit labels.
2. Demolish all panels, castings, switch- and instrument-boards.
3. Destroy all controls, switches, relays, connections, and meters.
4. Rip out all wiring and cut interconnections of electrical equipment. Smash gas, oil, and water-cooling systems in gas-engine generators, etc.
5. Smash every electrical or mechanical part, whether rotating, moving, or fixed.
6. Break up all operating instruments such as keys, phones, microphones, etc.
7. Destroy all classes of carrying cases, straps, containers, etc.
8. Bury or scatter all debris.

DESTROY EVERYTHING!

★

Unsatisfactory Report

For U. S. Army Air Force Personnel:

In the event of malfunctioning, unsatisfactory design, or unsatisfactory installation of any of the component units of this equipment, or if the material contained in this book is considered inadequate or erroneous, an Unsatisfactory Report, AAF Form No. 54, or a report in similar form, shall be submitted in accordance with the provisions of Army Air Force Regulation No. 15-54, listing:

1. Station and organization.
2. Nameplate data (type number or complete nomenclature if nameplate is not attached to the equipment).
3. Date and nature of failure.
4. Radio model and serial number.
5. Remedy used or proposed to prevent recurrence.
6. Handbook errors or inadequacies, if applicable.

For U. S. Navy Personnel:

Report of failure of any part of this equipment during its guaranteed life shall be made on Form N. Aer. 4112, "Report of Unsatisfactory or Defective Material," or a report in similar form, and forwarded in accordance with the latest instructions of the Bureau of Aeronautics. In addition to other distribution required, one copy shall be furnished to the inspector of Naval Materiel (location to be specified) and the Bureau of Ships. Such reports of failure shall include:

1. Reporting activity.
2. Nameplate data.
3. Date placed in service.
4. Part which failed.
5. Nature and cause of failure.
6. Replacement needed (yes—no).
7. Remedy used or proposed to prevent recurrence.

For British Personnel:

Form 1022 procedure shall be used when reporting failure of radio equipment.

SAFETY NOTICE

THIS EQUIPMENT EMPLOYS HIGH VOLTAGES WHICH ARE DANGEROUS AND MAY BE FATAL IF CONTACTED BY OPERATING PERSONNEL. EXTREME CAUTION SHOULD BE EXERCISED WHEN WORKING WITH THE EQUIPMENT.

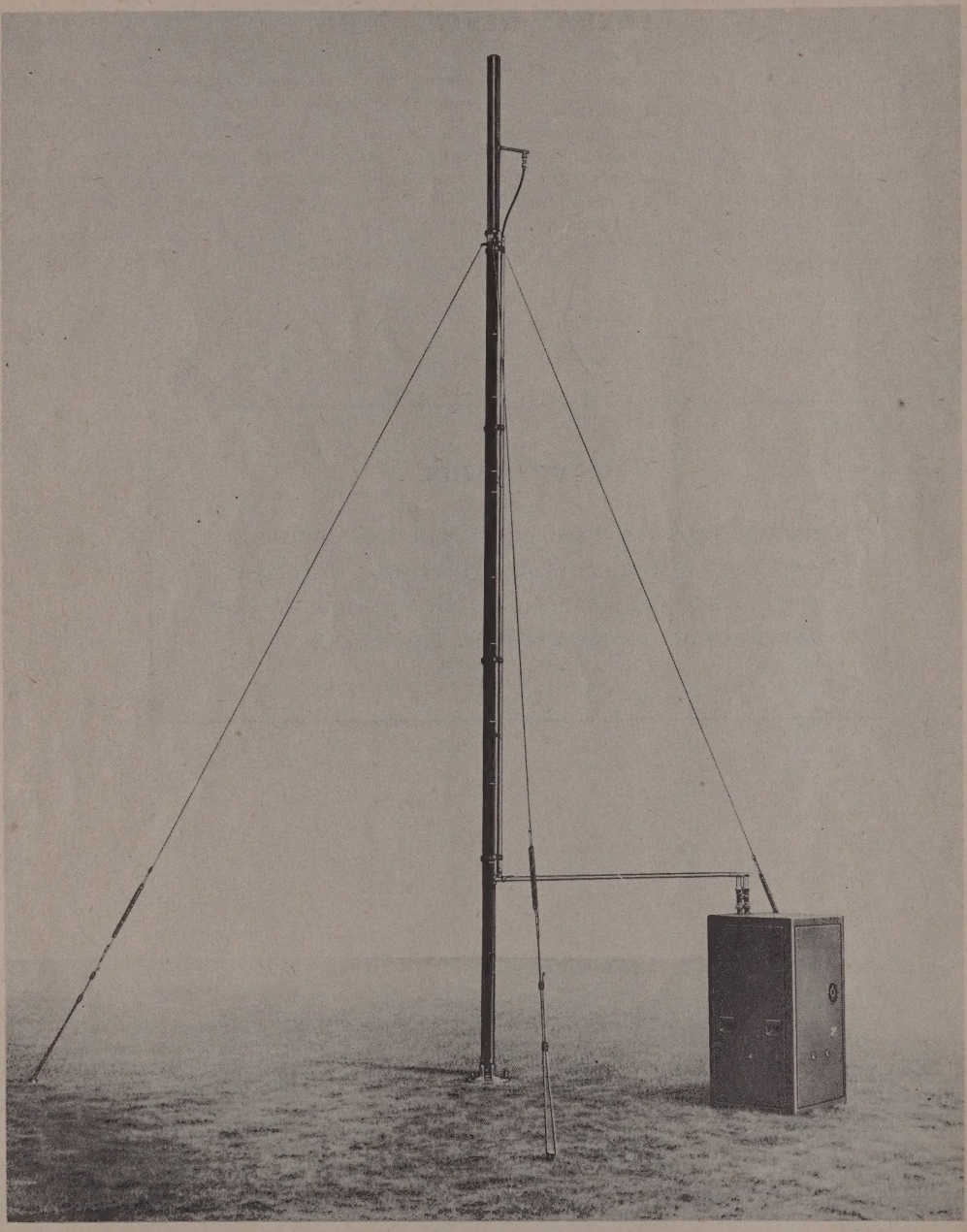


Figure 1-1. Radio Set AN/CPN-8 — Typical Installation

SECTION I
GENERAL DESCRIPTION

1. GENERAL.

a. Radio Set AN/CPN-8 is an automatic transponder beacon designed for ground use and for transportation by aircraft. Since operation of the radio set is fully automatic, no remote operation is necessary. Aural monitoring of the equipment is possible. Connections are provided for an external speaker and a remote alarm circuit to indicate malfunctions of the equipment to some remote location.

b. The radio set is designed to operate on either 115 volts or 230 volts, 50 to 70 cycles alternating current. The maximum power required is approximately 1300 watts. Approximately 15 amperes current is drawn at 115 volts input.

2. EQUIPMENT SUPPLIED.

The following table lists the equipment supplied:

Quantity per Equipment	*Name of Unit*	*Army Type Designation*	*Navy Type Designation*	*Overall Dimensions (Inches)*	*Weight (Pounds)*	*Numerical Series of Reference Symbols*
1	Case containing:	CY-68/CPN-8		23″ x 27″ x 46″	188	
	1 Monitor Unit	TS-121/CPN-8		10″ x 17″ x 22″	75	100-199
	1 Receiver Coder Unit	R-56/CPN-8		10″ x 17″ x 22″	73	200-499
	1 Transmitter-Modulator	T-50/CPN-8		11″ x 17″ x 22″	110	500-599
	1 Voltage Control Unit	CN-11/CPN-8		8″ x 17″ x 22″	64	600-699
	1 Cord (30″ test cord)	CX-270/CPN-8				
	1 Cord (25 ft. power cord)	CX-271/CPN-8				
1	Case containing:	CY-166/CPN-8		14″ x 14-1/2″ x 63″	392 (total)	
	1 Transmission Line (transmitting) (See Note 1.)	CG-172/CPN-8				
1	1 Transmission Line (receiving) (See Note 2.)	CG-173/CPN-8				
	1 Cord ("Y" shaped power cord)	CX-272/CPN-8				
	1 Antenna Support (See Note 3.)	AB-18/CPN-8				
	1 Mast Head (transmitting and receiving antenna).	AS-80/CPN-8				
1	Case Miscellaneous equipment (containing operating spare parts) (See Note 4.)	CY-248/CPN-8		20″ x 25″ x 54″	300	

Total weight of radio set cabinet and components 510 lbs. Total weight of antenna case and contents 392 lbs.

Note 1: Transmission Line CG-172/CPN-8 consists of the following parts:

		Mfg. Nos.
6	5-foot Standard Coaxial (7/8″ sections)	30X102557
1	5-foot Standard Coaxial (7/8″ section with Pressure Fittings)	51X102556
5	Standard Right Angle (7/8″ joints)	58B106559
2	18-inch Flexible Transmission Lines (Cable RG-14/U) (RMA-10)	58C101220
1	Special Fitting 10-5/8″ long plus rubber bellows (32A100031)	51B100399
1	Transmission Line Fitting, Special Right Angle Joint	47A100916

Note 2: Transmission Line CG-173/CPN-8 consists of the following parts:

6	5-foot Standard Coaxial (7/8″ Sections)	30X102557
1	5-foot Standard Coaxial (7/8″ Section with Pressure Fittings)	51X102556
5	Standard Right Angle (7/8″ Joints)	58B106559
1	Pressure Gauge	52A102187
1	31-inch Flexible Transmission Line (Cable RG-14/U) (RMA-10)	58C101221
1	Special Right Angle (7/8″ Joint 10 inches long). (Array Feed Section)	47B101219
2	18-inch Flexible Transmission Line (Cable RG-14/U) (RMA-10)	58C101220
1	Terminal Fitting (10-5/8″ long plus Rubber Bellows (32A100031)	51B100399

Note 3: Antenna Support AB-18/CPN-8 consists of the following parts:

3	5-foot upper mast sections	51D100846
1	5-foot bottom mast section with ball on lower end	51D100847
1	Rectangular base plate (for soft ground)	64B100535
1	Circular base plate	62K100424
3	Guy wires cable assembly	51A107176
3	Guy wire anchors	47C100849
4	Plumbing support assembly	51X107173
3	Anchor pins assembly	51B100609
2	Spanner wrenches	66C100302

Note 4: Miscellaneous Equipment:

1	Plumb bob and line assembly	51A107177
1	Ground stake assembly	47B103348
1	Sledge hammer	66X100850
1	Wrench, antenna cap	66B100181
1	Offset Screwdriver or 1 Box End Wrench (with later equipment)	66A109338
1	Pump with 7-foot hose	66C102186
4	Hose, Cable Bypass	47A101287
8	Clamp, Cable Bypass Hose	42A108111
1	Hose, coaxial line coupling	47B101279
1	Ground cable	1X107178
2	Wavelength Plumbing Section 5/8″	58B105141
2	Inner Conductor 5/8″	47A105144
2	Wave Length Plumbing Section 3/4″	58K105142
2	Inner Conductor 3/4″	27A105145
2	Wave Length Plumbing Section 7/8″	58X105143
2	Inner conductor 7/8″	47K105146
2	Antenna mounting cap	15A100179
2	Bushing, antenna bellows	43A100032
50	Gasket plumbing	32A102189
200	No. 10 Lockwasher, split	4S9735
*2	Pressure Testing Caps.	

3. EQUIPMENT REQUIRED BUT NOT SUPPLIED:

The following table lists the equipment required but not supplied:

Quantity	*Name of Unit*	*Army Type Designation*	*Overall Dimensions*	*Weight Pounds*	*Number Reference Nos.*
1	Dummy Antenna (Phantom Antenna and Attenuator)	TS-74/UPN			

*These may be absent from the first few equipments. If so, see section II, paragraph 1p, for details on fabrication.

SECTION II
INSTALLATION AND ADJUSTMENT

1. INSTALLATION.

a. PRELIMINARY.—Radio Set AN/CPN-8 proper is contained in a weatherproof duralumin case, Case CY-68/CPN-8. Antenna equipment, spares and tools are packed in a weatherproof steel case, Case CY-166/CPN-8. The operating spares are packed in a weatherproof wood or steel case, Case CY-248/CPN-8. All of these cases are designed to be shipped safely without crates.

b. PROCEDURE.

(1) RADIO SET LOCATION.

(*a*) The antenna must be located as high as possible and should have an unobstructed view of the horizon. While the radio set will operate if small obstructions (buildings, etc.) are present, the range will be reduced in the direction of these obstructions. The antenna must be so positioned that the r-f feed lines running down the mast will be toward the radio set cabinet (see fig. 1-1).

b. The radio set cabinet must be located within 20 feet of the antenna, and should be on a firm foundation. If the ground is not hard, a platform of logs, boulders, cement or similar solid material will serve as a foundation. The radio set should not be permanently positioned, however, until some idea is had as to the exact distance it will be placed from the antenna.

(2) ANTENNA INSTALLATION.

(*a*) For convenience during installation, the antenna case (see fig. 5-1) may be completely unpacked. The components must be placed on clean paper, boards, etc. Special care must be taken with the threaded mast sections to protect the threads from dirt and sand.

CAUTION

Do not bend or dent the transmission lines or fittings! Do not crush, burr or foul the mast section threads!

(*b*) If the ground is soft enough to be dented with the heel of a shoe, place the rectangular base plate 64B100535 (fastened in the lid of the antenna case) on the ground in the selected position. If the ground is not soft enough to be easily dented, the base plate can be omitted.

(*c*) Position the mast base support (62K-100424) in alignment with the anchor pin holes of the base plate if it is used (see fig. 5-2). The support must be positioned so that the mast, when assembled, will not lie on the ground in a straight line with the radio set case.

(*d*) Anchor the rectangular base plate (if used) and the mast base support to the ground with two of the anchor pins (51B100609), as shown in figure 5-2. A hammer is provided for driving the anchor pins. Note that these anchor pin holes are spaced 120 degrees apart and thus point out the location of the guy-wire stakes.

(*e*) Locate the guy-wire anchor positions.

(*1*) Stretch one guy-wire (51A107176) from the center of the antenna base outward with the wire passing directly over one of the anchor pins or holes.

(*2*) Measure the length of 2-3/4 grounding stakes (47B103348) from the center of the antenna base along the guy wire. This grounding stake is included in the antenna case (see fig. 5-1). The position thus determined is the location of one guy-wire anchor (47C100849).

(*3*) Repeat steps (*1*) and (*2*) above using the remaining anchor pins or holes to locate the other two guy-wire anchor positions.

(*4*) Screw the guy-wire anchors into the positions determined for them, using the third antenna base anchor pin for a lever. If the soil is very firm or rocky, the guy-wire anchors may be installed by digging a hole at each anchor location, inserting the anchor and refilling the hole with rocks and soil. Pack the rocks and soil firmly when filling the holes.

(*f*) Place the ball mast base (51D100847) into the antenna mast base socket. Tighten the ball locking screw and the locknut. The ball should be free to rotate but should not come out of the socket.

CAUTION

Inspect all mast section (51D100846) threads for burrs and dirt! Clean, if necessary. Damaged or dirty threads cannot be assembled!

(*g*) Assemble the mast sections by screwing them together, tightening them by means of the spanner wrenches (66C100302) supplied in the antenna case. (See fig. 5-2.)

(*h*) Measure and attach the plumb bob and cord (51A107177) as follows:

(*1*) Hold the center of the plumb bob against one of the four leveling sight holes in the bottom section of the mast. (See fig. 5-2.)

(*2*) While holding the plumb bob in position, stretch the plumb bob cord along the mast until it is just taut. Do not pull too hard!

(3) Mark the point of the cord at the end of the mast and tie the cord at this point to the antenna plumb bob stud (see fig. 5-2). Do not cut off the excess cord.

(4) Wind the cord around the plumb bob all the way to the antenna.

(5) When attaching the antenna (Mast Head AS-80/CPN-8) to the mast, insert the plumb bob and wound-up cord into the open end of the mast before coupling the antenna to the mast. Do not allow the cord to become unwound before the antenna is fitted to the mast. Otherwise the cord will be cut by the screw threads upon assembly.

CAUTION

Handle the antenna section gently. Do not attempt to screw the antenna section into the mast while grasping the plastic weather housing, nor by making use of any projections.

(*i*) Attach and tighten the antenna (Mast Head AS-80/CPN-8) to the top of the mast in the same way that the mast sections were coupled together using the spanner wrench.

(*j*) Drive the third antenna base anchor pin into place as described in sub-paragraph preceding (*d*).

(*k*) Rotate the antenna and mast assembly so that the antenna connection fittings face the back of the radio set cabinet.

(*l*) Remove the r-f line protective caps from the r-f connectors on the antenna.

(*m*) Locate the long receiver antenna r-f right angle connector (47B101219) and the short transmitter antenna r-f right angle connector (47Z100916) in the antenna box. Remove the protective caps and see that a rubber sealing gasket is provided at each connection. (An envelope of spare gaskets is provided in the antenna case.)

IMPORTANT

There must be a rubber gasket at every r-f feed line or angle junction. The entire system, including the rigid radio set plumbing, must be airtight at every point. Air-leaks cannot be tolerated!

(*n*) Using rubber gaskets and checking that all of the male r-f plugs make good connection to the inner coaxial tubes into which they fit, attach the long r-f angle to the (upper) r-f receiving antenna connector and the short r-f angle to the (lower) r-f transmitting antenna connector using the same screws which were used to attach the protective caps to the angles. Spare screws and lock washers will be found in envelopes in the antenna case.

CAUTION

Never get dirt into r-f lines or angles! Do not dent or damage them!

(*o*) Loosely attach the four coaxial line clamps (51X107173) to the mast as shown in fig. 5-2. The clamps should be free enough to be moved by hand.

(*p*) Attach the two pressure testing caps to the r-f angles attached in step (*n*). Connect the pump to one cap fitting and the pressure gauge to the other.

IMPORTANT

The pressure caps may not be available, in which case, rather than assemble the entire system before testing for air leaks, make two pressure caps as follows:

1. Select two removed protection caps.

2. Drill one 11/32″ hole in the dome of each and tap each hole with a 1/8″-27 pipe (NPT) thread. Mount one of the tire valve fittings on one cap and the pressure gauge on the other.

3. The protection caps are not metallic. Use extreme caution in drilling, tapping and installing the fitting and gauge, as well as when tightening the coupling flange screws! It may be necessary to seal the threads with glyptal or white lead.

(*q*) Pump the antenna housing to a pressure of five pounds. If the pressure falls rapidly, a leak in either the antenna cover or the r-f line coupling joints is indicated. If leaks are present, apply very soapy water to the joints and the antenna cover. Soap bubbles will form wherever there are leaks provided that pressure is applied by the pump. (Refer to sec. IV, par. 1 for repairing of such leaks.)

(*r*) If no leaks are present, remove the pressure caps and continue with the r-f plumbing assembly as follows:

(1) Remove the protective caps from two of the five foot r-f coaxial sections. Make sure that rubber gaskets are provided.

(2) Place two r-f line sections (30X102557 *not 51X102556*) in the upper two mast clamps and tighten the clamps slightly.

CAUTION

The r-f lines must be free to move in the clamps.

(3) Connect the left-hand r-f line (with the lines between the operator and the mast) to the lower, short antenna r-f angle (transmitting) installed in (*n*), making sure, as always, that the inner r-f coaxial plugs and tubes make good contact. (See fig. 5-2.)

(4) Connect the right-hand (the lines between the operator and the mast), r-f line to the long upper antenna r-f angle (receiving) by means of the longest piece of flexible coaxial cable (58C101221) in the antenna case.

IMPORTANT

The two r-f sections (51X102556) containing brass plugs must not form part of the antenna mast plumbing!

(5) Make sure that rubber gaskets are in place and tighten the coupling flange screws tightly!

(6) Connect the pressure testing caps to the free end of the two lines just installed. Connect the pressure gauge and pump as described in (*p*) and test for air leaks as outlined in (*q*).

(7) If no leaks are present, remove the pressure testing caps and couple on two more sections of r-f coaxial line as explained in (*r*)(1), this paragraph.

(8) Check again for leaks at the bottom of these lines. If none are present, couple on two more sections.

(9) Continue this assembling and pressure testing until all of the mast lines have been installed and checked, distributing the four coaxial line clamps as shown in fig. 5-2.

(10) Align all of the coaxial line clamps so that the assembled r-f lines are parallel to the mast, sighting down the r-f lines while adjusting the clamp positions. Securely clamp the r-f lines to the clamps and the clamps to the mast when alignment is complete.

CAUTION

Do not tighten the clamps so much as to bend or dent the r-f lines!

(11) Make the pressure test at the ground end of the r-f line assembly (as previously described) after the clamps have all been aligned and tightened.

(*s*) Attach the guy-wire assemblies to the bottom of the antenna section by screwing the guy-wire swivel studs into the tapped holes provided. Straighten out the guy-wires and align the swivels so that they rotate up and down relative to the mast (not crosswise). Tighten the lock nut on each securely.

(*t*) Place at least one man to hold the antenna mast base plate in place. One man, and preferably two, should handle the guy-wires, assisting in lifting the mast when erection is past a certain point but mainly to steady the mast during erection. One man, and preferably more, should raise the mast up and into erect position while walking toward the antenna base (similar to raising a long ladder).

CAUTION

Be sure that the plumb bob slides down inside of the antenna mast before it is fully raised. Jiggle the mast to accomplish this. Do not raise the mast by lifting on the plastic antenna cover!

(*u*) Attach the guy-wires to the guy-wire anchors as shown in Fig. 5-2 and tighten the guy-wires by means of the guy-wire turnbuckles.

(*v*) Align the mast vertically by adjusting the guy-wire turnbuckles and sighting on the plumb bob through the mast sighting holes. Sight from the small hole, through the mast, to the large hole! The mast is properly aligned when the line-of-sight through all the mast sight holes is obstructed by the plumb bob.

(*w*) Tighten the guy-wire turnbuckles, keeping the mast aligned meanwhile, until the guy-wires are very taut!

(*x*) Tighten all turnbuckle locknuts!

(3) RADIO SET CABINET INSTALLATION.

(*a*) Place the cabinet on solid ground or on the constructed foundation within 20 feet of the antenna mast. The back of the cabinet must face the mast and the mast r-f lines must be between the mast and the cabinet.

(*b*) The prescribed installation is one with completely rigid r-f feeder lines between the antenna mast and the radio set. Where the mast and the cabinet may be conveniently placed on the same level, or where it is possible to adjust the height of the cabinet and spacing from the mast, arrange for such a rigid installation (see fig. 1-1) as described in section II, par 3.

(*c*) When doubt exists as to the practicability of such an installation, or the positioning is impossible, make the flexible installation described in section II, par. 1, (4).

IMPORTANT

Plan the type of installation necessary but do not connect the antennas to the radio set until further notice!!

(4) DUMMY ANTENNA INSTALLATION.

(*a*) Using the antenna cap-wrench (66B100-181) provided (to be found in the antenna case) remove the two radio set cabinet parts from the top of the cabinet and screw the two flanged cabinet bellows bushings (43A100032) (from the antenna case) into the exposed openings.

(*b*) Obtain the two r-f cabinet entrance line sections (51B100399) from the antenna case and remove the protective caps.

(*c*) Attach the rubber protective bellows (32A-100031) (included in the antenna case) to the r-f cabinet entrance line sections. This is done by sliding the small end of the bellows up into the groove in the bellows-retaining flange.

(*d*) Remove the back door of the radio set cabinet.

(*e*) Using the offset screw driver to be found in the antenna case, attach the r-f cabinet entrance lines to the r-f lines inside of the cabinet, using the

rubber gaskets, and in the same manner as the r-f lines on the antenna mast were coupled together.

Note

In later models, cap screws and a box end wrench are supplied instead of the offset screw driver.

(*f*) Force the unattached end of the rubber protective bellows of each line over the end of the flanged bushing.

(*g*) Attach the dummy antenna (Phantom Antenna and Attenuator TS-74/UPN to be found in the auxiliary test equipment kit (Radar Test Set AN/CPM-2), to the receiver r-f cabinet entrance line, using one of the 18″ flexible transmission lines (58C101220) for this purpose. This is the right-hand line when facing the front of the radio set cabinet.

(*h*) Replace the back door of the cabinet.

(5) GROUND CONNECTIONS.

(*a*) Drive grounding stake (41B103348) into the ground near the radio set cabinet. Allow only one foot of the stake to protrude above ground.

(*b*) Using the grounding cable (1X107178) provided in the antenna case, connect the grounding stake to the ground post located near the "A.C. POWER" receptacle on the rear of the voltage control unit.

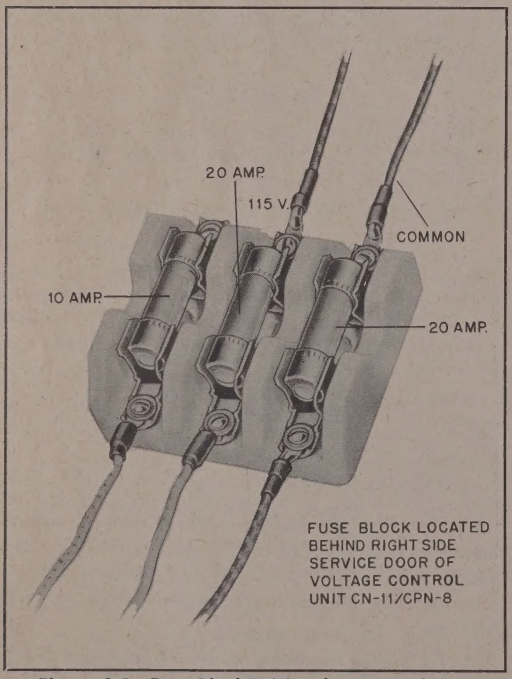


Figure 2-1. Fuse Block Wiring for 115-Volt A-C Power Source

(6) POWER CONNECTIONS.

(*a*) Radio Set AN/CPN-8 is shipped with the power wiring connected for 115-volt, 60-cycle operation. (See fig. 2-1.)

(*b*) If the set is to be operated on 230-volt, 60-cycle power, the following changes must be made:

(*1*) Open the right hand door of the voltage control unit.

(*2*) Remove the orange and white lead from the upper terminal of the center fuse.

(*3*) Connect this orange and white lead to the upper terminal of the left-hand fuse plug. (See fig. 2-2.)

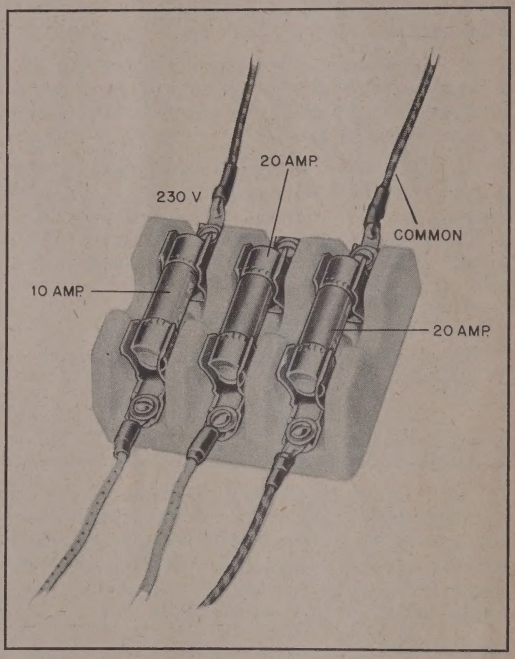


Figure 2-2. Fuse Block Wiring for 230-Volt A-C Power Source

(*c*) Obtain the 25-foot ac power cable (Cord CX-271/CPN-8) from the antenna case.

(*1*) Be sure that all panel switches so marked are in the "OFF" position and that the equipment is properly grounded.

(*2*) Open both of the ventilating doors or ports on the back door of the cabinet.

(*3*) Plug the four prong plug at one end of the power cable into the left-hand four contact socket marked "A.C. LINE INPUT" at the rear of the voltage control unit. (See fig. 2-3.)

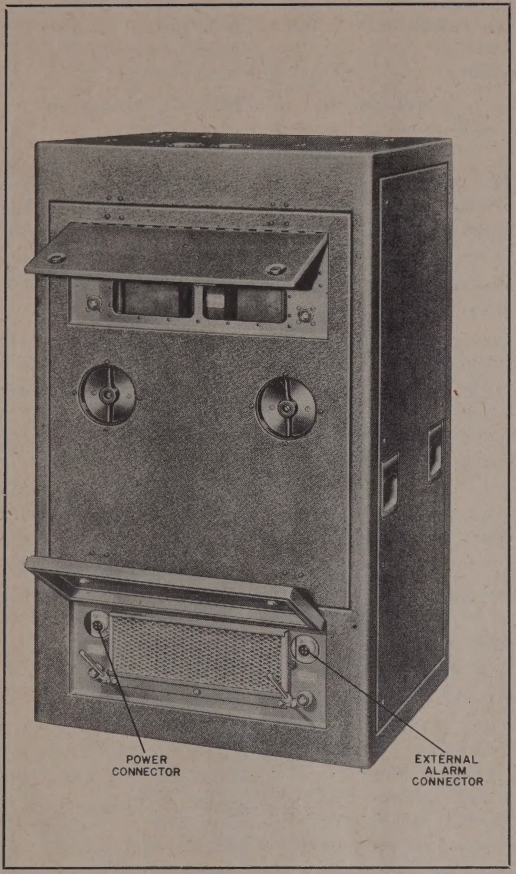


Figure 2-3. Case CY-68/CPN-8 — Rear View Showing Connectors for External Circuits

(4) Plug the other end of the power cable into the power source.

(7) REMOTE ALARM AND SPEAKER CONNECTIONS.

Another four-contact socket (the right-hand one when seen from the back of the cabinet) on the rear of the voltage control unit is accessible through the lower air port. This provides connection for an alarm circuit and for an external aural monitor speaker. (See paragraph 5, b, this section for installation details.)

2. ADJUSTMENTS.

CAUTION

This equipment operates at voltages in excess of 7000 volts! Be careful! Death is permanent!

a. EQUIPMENT REQUIRED.—The radio set has built-in test equipment. No extra equipment, except the dummy antenna, is required.

b. TEST PROCEDURE.

(1) PRELIMINARY CHECKS.

(*a*) Check the air intake and exhaust ports in the rear door of the cabinet and see that they are open. Do not operate the radio set with these ports closed! Check to see that the air cleaner is free of dirt and properly oiled.

(*b*) Open the front door of the cabinet and all of the service doors on the front panel. Remove the back door of the cabinet.

(*c*) Check every tube thus made visible and see that it is firmly seated in its socket and that all the tube clamps are locked.

(*d*) Close all the service doors and replace the back door of the cabinet. Leave the airports and the front door of the cabinet open.

(*e*) Turn the "LINE VOLTAGE" control wheel on the panel of the voltage Control Unit CN-11/CPN-8 completely counterclockwise.

(*f*) Place the "FILAMENT POWER" switch on the Modulator-Transmitter Unit T-50/CPN-8 panel in the "ON" position. The green light on the modulator-transmitter panel and the red light on the panel of the Receiver-Coder Unit R-56/CPN-8 should be lighted. The "A-C VOLTS" meter on the modulator-transmitter panel should indicate some small reading above zero.

(*g*) Turn the "LINE VOLTAGE" control wheel clockwise until the "A-C VOLTS" meter reads "115" (volts).

(*h*) If the blower motors are operating, a whirring sound will be heard in the cabinet. If the blower motors are not operating, turn off the "FILAMENT POWER" switch and check the blower motor fuse. (See section IV.)

(*i*) If the equipment has not been in operation for 24 hours or longer, wait 30 minutes before proceeding with the adjustments. Otherwise, approximately three minutes is sufficient.

(*j*) After the warm-up period, place the modulator-transmitter "PLATE POWER" switch to the "ON" position. After three seconds, the red light on the modulator-transmitter panel should come on.

(*k*) Turn the modulator-transmitter "METER SELECTOR" switch to the "HIGH VOLTAGE" position. The "D.C. KILOVOLTS" meter on the

modulator-transmitter panel should indicate a reading between "6" and "7" (kilovolts) on its upper scale.

(*l*) Place the "PLATE POWER" switch in the "OFF" position.

(2) MONITOR ADJUSTMENTS.

(*a*) GENERAL.

(*1*) Place the monitor "POWER" switch in the "ON" position. (See fig. 5-5).

(*2*) Allow the monitor unit to warm up for two or three minutes.

(*3*) Adjust the monitor "VERT. CENTERING," "HORIZ. CENTERING," "FOCUS" and "INTENSITY" controls to obtain a clear, bright centered trace on the cathode ray tube (CRT) screen.

(*b*) SIGNAL GENERATOR CALIBRATION.

(*1*) Place the monitor "RF" switch in the "OFF" position.

(*2*) Turn the indicator of the monitor "FREQUENCY" knob to the white panel index line located below the lower rim of the "FREQUENCY" knob skirt.

(*3*) Turn the monitor "THERM. SW" knob to the "SIG. GEN" position.

(*4*) Turn the monitor "PULSE-CW" knob to the "CW" position.

(*5*) Turn the monitor "REPETITION RATE" knob to the "1600" position.

(*6*) Adjust the monitor "THERMISTOR ZERO SET" control to give a monitor panel meter reading of "0."

(*7*) Depress and hold down the "SHUNT" button on the monitor panel, adjusting the "THERMISTOR ZERO SET" knob again for a meter reading of "0."

(*8*) Place the "RF" switch in the "ON" position. The red pilot light on the monitor panel should now be lighted. If it fails to light, check the position of the back panel, to make sure the interlock is closed.

(*9*) Depress and hold the "SHUNT" button and, at the same time, adjust the monitor "R.F. OUTPUT" knob to give a monitor meter reading of "100" (full scale deflection).

(*10*) Release the "SHUNT" button.

(*11*) Place the "PULSE-CW" switch to the "PULSE" position.

(3) RECEIVER ADJUSTMENTS.

(*a*) Turn the monitor "CALIBRATE" knob to the "ON" position.

(*b*) Turn the monitor "SWEEP SELECTOR" knob to position "1."

(*c*) Adjust the monitor "SWEEP EXPANDER" knob to set the observed CRT pip spacings to exactly one major division (10 small divisions) on the CRT celluloid scale. Use the "HORIZ. CENTERING" knob as an aid in making this adjustment.

(*d*) Turn the "CALIBRATE" knob to the "OFF" position.

(*e*) Connect the "REC.-VISUAL" connector on the receiver-coder panel to the monitor "VIDEO INPUT" connector by means of the monitoring cable (Cord CX-270/CPN-8) supplied.

(*f*) Adjust the monitor "ATTENUATION" dial so that a signal of about five small CRT scale divisions in amplitude appears on the CRT screen.

(*g*) Open the receiver-coder service door (in the panel), and locate the crystal cavity. This is located at the extreme right (facing the front of the cabinet) center behind the first row of tubes. A plunger is mounted on this cavity. This plunger extends toward the panel and slightly to the right.

(*h*) Adjust this plunger until the signal on the CRT screen is at maximum height. Close the service door.

(*i*) Adjust the "ATTENUATION" dial and the monitor "PULSE WIDTH-FINE-COARSE" knobs to obtain a signal in height and width identical to figure 2-4.

(*j*) Adjust the "ATTENUATION" dial to obtain a CRT signal identical to figure 2-5.

(*k*) The "ATTENUATION" dial should read "36" or more. If the reading is below "36," check the signal generator calibration as in paragraph 2b 2(b). If the reading is still below "36," refer to the maintenance manual for instructions on crystal replacement. The equipment will operate with readings of less than "36" but the operating range will be reduced.

(4) DISCRIMINATOR ADJUSTMENTS.

(*a*) Connect the monitoring cable between the "VIDEO INPUT" and the receiver-coder "DISCRIM" connectors.

(*b*) The discriminator output signal should appear on the CRT screen as shown in figure 2-6. This signal is the same as the one shown in figure 2-7. but in a fairly unstable condition. In other words, the signal itself appears to flicker on the screen.

(*c*) If the signal shown in figure 2-6 cannot be obtained, unlock the receiver-coder "LOWER LEVEL" screwdriver adjustment and adjust this control to obtain a CRT signal identical to figure 2-6.

(*d*) Turn the "ATTENUATION" dial slowly toward "0" reading. After the dial has been moved two or three divisions, the signal should appear as in figure 2-7.

(*e*) Continue to rotate the "ATTENUATION" dial to "0". The signal shown in figure 2-7 should not change at any degree of rotation of the dial.

(*f*) If the signal does change to that shown in

figure 2-7 as the dial is turned toward "0", readjust the "LOWER LEVEL" control slightly to again obtain a signal identical to figure 2-7.

(*g*) Lock the "LOWER LEVEL" control by means of its lock nut. Watch the CRT screen and be sure that the locking action does not disturb the adjustment just made.

(*h*) The receiver-coder "INTERVAL CONTROL" is inoperative. Refer to the maintenance manual for instructions for placing this control into operation if such operation is desired.

(5) CODER ADJUSTMENTS.

(*a*) Adjust the "ATTENUATION" dial to "20."

(*b*) Connect the monitoring cable between the "VIDEO INPUT" and the receiver-coder "CODER" connectors.

(*c*) Turn the "SWEEP SELECTOR" knob to position "3."

(*d*) Place the receiver-coder "CODE ELEMENT" knob to position "6."

(*e*) Place all of the receiver-coder "CODE SPACING" toggle switches to their "L" position.

(*f*) Six coding signals will appear on the CRT screen as shown in figure 2-8. They should be at least 15 small scale divisions high.

(*g*) Change all of the "CODE SPACING" switches from position "L" to position "S." Start with the extreme right-hand switch and throw each consecutive switch, moving toward the left. As each switch is thrown, the corresponding interval between the CRT coding signals will decrease.

(*h*) After all of the "CODE SPACING" switches have been changed, turn the "CODE ELEMENT" switch from position "6" to position "2" consecutively. At each position of the switch, the number of code signals should be the same as the number above the "CODE ELEMENT" knob indicator.

(*i*) Turn the "CODE ELEMENT" switch to position "6" and place each "CODE SPACING" switch to its "L" position.

(6) MODULATOR-TRANSMITTER ADJUSTMENTS.

(*a*) MODULATOR SIGNAL LENGTH CHECK.

(*1*) Remove the dummy antenna from the receiver input r-f line and connect it to the transmitter output r-f cabinet entrance line.

(*2*) Connect the monitoring cable between the "VIDEO INPUT" and the modulator-transmitter "MONITOR" connectors.

(*3*) Place the modulator-transmitter "PLATE POWER" switch in the "ON" position.

(*4*) Turn the monitor "SWEEP SELECTOR" switch to position "3." The modulator output signal should appear on the CRT screen as shown in figure 2-10.

(*5*) Turn the "SWEEP SELECTOR" switch to position "1". The first code signal of the sequence will appear on the CRT screen and should appear as shown in figure 2-9. A slight "jitter" at point "A" is normal. Overall signal amplitude jitter indicates circuit trouble. Refer to the maintenance manual for detailed procedure for correcting overall "jitter."

(*b*) TRANSMITTER PEAK CURRENT ADJUSTMENT.

(*1*) Turn the monitor "REPETITION RATE" switch to the "1600" position.

(*2*) Turn the "CODE ELEMENT" switch to position "6."

(*3*) Turn the modulator-transmitter "METER SELECTOR" switch to the "TRANSMITTER CURRENT" position.

(*4*) Unlock and adjust the modulator-transmitter "MOD. SCREEN VOLTAGE" screwdriver adjustment to obtain a "DC. KILOVOLTS" meter reading of "20" on the lower meter scale.

(*5*) Lock the control, after making the adjustment, by means of the locknut. Be careful not to upset the adjustment while locking the control.

(*c*) TRANSMITTER FREQUENCY ADJUSTMENT.

(*1*) Connect the monitoring cable between the monitor "VIDEO INPUT" and "CAVITY AMP" connectors.

(*2*) The "SWEEP SELECTOR" switch should be in position "3."

(*3*) Unlock the modulator-transmitter "TRANSMITTER TUNING" dial by turning the knurled wheel behind the dial to the left.

(*4*) Adjust the "TRANSMITTER TUNING" dial for maximum signal amplitude as seen on the CRT screen.

(*5*) Lock the "TRANSMITTER TUNING" dial by turning the knurled wheel to the right. Do not upset the adjustment just made. Watch the signal amplitude on the CRT screen while locking the dial.

(*d*) TRANSMITTER POWER OUTPUT ADJUSTMENT.

(*1*) The "REPETITION RATE" switch should be in the "1600" position.

(*2*) Place the monitor "RF" switch to the "OFF" position.

(*3*) Turn the "THERM. SW." knob to the "TRANS" position.

(*4*) Depress and hold down the monitor "SHUNT" button.

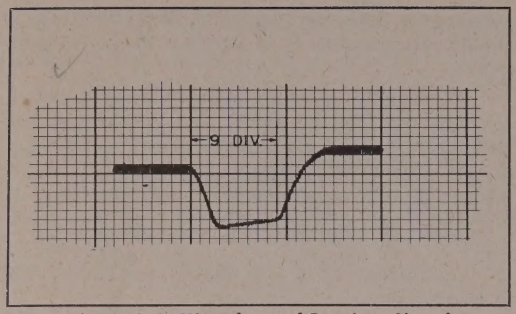


Figure 2-4. Waveform of Receiver Signal for Pulse Width Adjustment

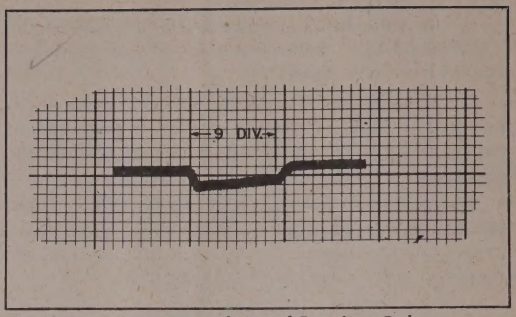


Figure 2-5. Waveform of Receiver Pulse — Tangential Signal

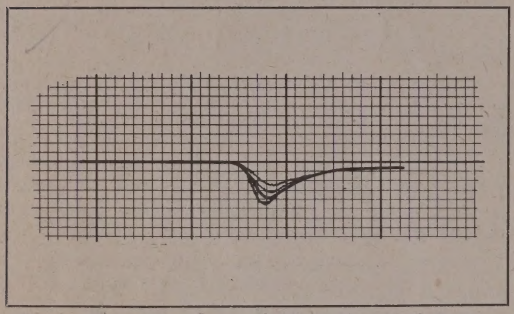


Figure 2-6. Waveform of Discriminator Output — Tangential Receiver Signal

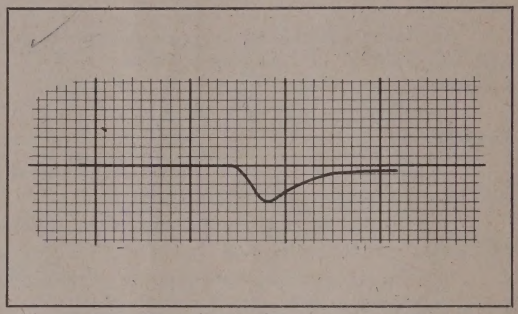


Figure 2-7. Waveform of Discriminator Output — Receiver Signal Greater than Tangential

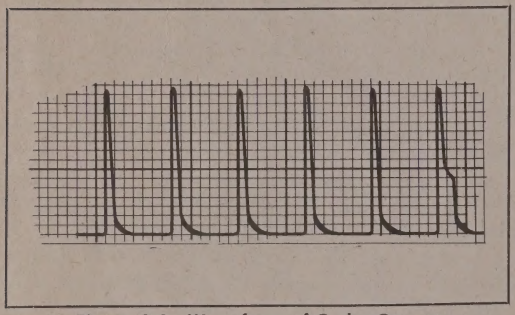


Figure 2-8. Waveform of Coder Output

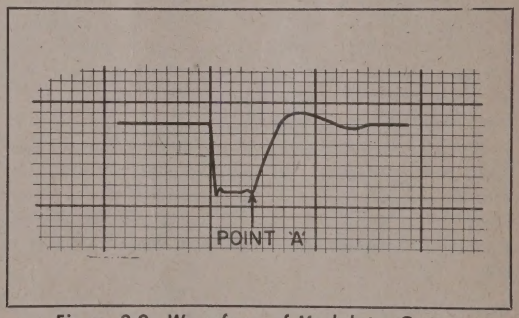


Figure 2-9. Waveform of Modulator Output (One pulse)

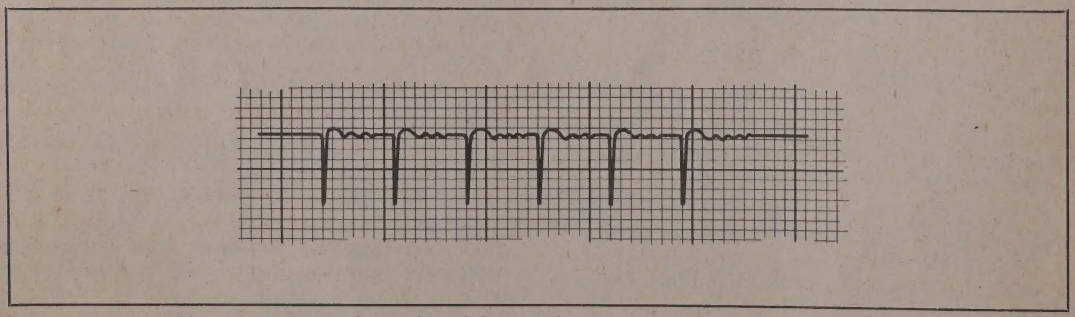


Figure 2-10. Waveform of Modulator Video Output (1-1-1-1-1-1 code pattern)

(5) Adjust the monitor "THERMISTOR ZERO SET" knob to obtain a monitor panel meter reading of "0."

(6) Place the "RF" switch in the "ON" position.

(7) The needle of the meter should stop in the red area on the meter face when the "SHUNT" button is depressed.

(8) Release the "SHUNT" button.

(9) Place the monitor "POWER" and "RF" switches in the "OFF" position.

(10) Place the modulator-transmitter "PLATE POWER," then the "FILAMENT POWER" switches to the "OFF" position.

(11) Remove the dummy antenna from the transmitter r-f cabinet entrance line and store it with the auxiliary test equipment.

3. RIGID CONNECTION OF THE RADIO SET TO THE ANTENNAS.

Note

During this installation, remove all of the protective caps from new components used and be sure to use rubber gaskets between all coupling flanges. Be careful not to get dirt or water into the components! Do not force any threads and coat all threads with white lead or some other sealing compound. See that all coaxial plugs make good contact with the inner coaxial tubing into which they fit. Do not damage nor dent any components.

a. Attach a coaxial right angle (58B106559) to each of the two r-f lines clamped to the mast. Do not tighten the coupling flange screws.

b. Attach a coaxial right angle (58B106559) to each of the cabinet entrance lines. Do not tighten the coupling flange screws.

c. Connect together as many rigid r-f coaxial line sections (30X102557) as necessary to form two horizontal r-f feed lines which will connect the radio set right angles to the antenna mast right angles. The two r-f line sections having brass plugs (51X102556) should be at the cabinet end of each of the r-f feed lines. Means must be provided for supporting the horizontal lines if more than one section in length is used.

d. Remove the brass plugs and insert the tire valve hose fittings in three of the four holes. Use white lead on the threads.

e. Connect the left-hand feeder (facing the mast from the cabinet) to the left-hand cabinet r-f coaxial right angle. Do not tighten the coupling flange screws. Connect the other end of the same feed line to the left-hand mast angle connector. Avoid damage to sections and couplings.

f. Connect the other feed line between the cabinet and the right-hand r-f coaxial right angle on the mast in the same manner.

g. Thoroughly tighten all coupling flange screws.

h. Attach the coaxial line coupling hose (47B101-279) between the two inner tire valve fittings; connect the pump to the third fitting and screw the pressure meter into the remaining hole. This is permanent. Use white lead on the screw threads of the meter.

i. Pump the lines to a pressure of five pounds and check for air leaks as previously described in Section II, paragraph 1 b. (2) (p) and (q).

4. FLEXIBLE CONNECTION OF THE RADIO SET TO THE ANTENNAS.

Note

The following procedure is used only when the antenna and cabinet are located at different levels. Otherwise the flexible coaxial r-f lines are not used. During this installation, remove all protective caps from new components used and be sure to use rubber gaskets between all coupling flanges. Be careful not to get dirt or water into the components. Do not force threads. Coat threads with white lead or some other sealing compound. See that all coaxial plugs make good contact with the inner coaxial tubing into which they fit. Do not damage nor dent any components.

a. Attach an r-f coaxial right angle (58B106559) to each of the r-f lines clamped to the mast. Do not tighten the coupling flange screws.

b. Attach an r-f coaxial right angle (58B106559) to each of the cabinet entrance lines and tighten the coupling flange screws.

c. Attach one of the four furnished flexible coaxial lines (58C101220) to each of the angles on the cabinet and the mast, and tighten the coupling flange screws.

d. Connect as many rigid coaxial line sections (30X102557) together as necessary to form two horizontal feed lines which will be used to connect the radio set r-f lines to the antenna mast lines. The two r-f line sections which have brass plugs (51X102556) should be at the cabinet end of each of the r-f feed lines. Means must be provided for supporting the horizontal lines if more than one section in length is used.

e. Remove the brass plugs and attach the tire valve hose fittings in three of the four holes, using white lead or other sealing compound on the threads.

f. Attach the rigid r-f feed lines to the flexible sections on the antenna mast. Support the other end of the feeders at about the same level as the ends at the mast.

g. Connect the left-hand cabinet r-f flexible coaxial

line (facing the mast from the cabinet) to the left-hand r-f rigid feed line and tighten the coupling flange screws.

h. Connect the other cabinet r-f flexible line to the remaining rigid r-f feed line and tighten the coupling flange screws.

i. Tighten all coupling flange screws in the r-f feed lines and angles.

j. Attach the coaxial line coupling hose (47B10-1279) between the two inner tire valve fittings; the pump to the third valve, and screw the pressure meter into the remaining hole. This is permanent. Use white lead on the screw threads of the meter.

k. Attach a pressure bypass hose (47A101287) between the fittings at each end of the same flexible r-f coaxial line and clamp in place with the hose clamps (42A10811) provided. Do this to both lines.

l. Pump the lines to a pressure of five pounds and check for leaks as previously described in section II, paragraph 1 b 2 (p) and (q).

5. AFTER-INSTALLATION TESTS AND ADJUSTMENTS.

a. TEST FOR "LONG LINES EFFECT."

(1) Place the radio set into operation as described in Section III, Page 3-1.

(2) Perform the operations and calibrate the signal generator as described in paragraph 2b(2)(b) (*1*) through (*11*) and paragraph 2b(3)(a) through (j) (except for steps (g) and (h.)

(3) Connect the monitoring cable between the monitor "VIDEO INPUT" and "CAVITY AMP" connectors.

(4) Place the "REPETITION RATE" switch to the "1600" position.

(5) Turn the "SWEEP SELECTOR" knob to position "3."

(6) Turn the "PULSE-CW" knob to the "PULSE" position.

(7) Set the "ATTENUATION" dial to "30."

(8) Adjust the "VERT. CENTERING," "HORIZ. CENTERING," "FOCUS" and "INTENSITY" controls to obtain a clear, bright, centered trace on the CRT screen.

(9) Unlock the "TRANSMISSION TUNING" dial and adjust the dial for maximum signal height on the screen. Note the reading on the dial at maximum signal reading.

(10) Turn the "REPETITION RATE" knob to position "800."

(11) Readjust the "TRANSMITTER TUNING" dial for maximum signal height on the screen. Note the reading indicated on the dial.

(12) A difference of three small dial divisions between the dial readings indicates "LONG LINES EFFECT." Refer to the maintenance manual for details regarding the correction of this effect.

(13) If the difference is less than the above mentioned three dial divisions, the "LONG LINES EFFECT" is not present and the tuning dial should be set mid-way between the two readings.

(14) Carefully lock the "TRANSMITTER TUNING" dial, making sure the adjustment is not upset.

(15) Place the "REPETITION RATE" switch to the "1600" position again.

b. CONNECTING AND ADJUSTING THE AURAL MONITOR AND REMOTE ALARM SYSTEM.

(1) The aural monitor, a component part of the receiver-coder unit, is provided for audible monitoring of the receiver output (from the "AURAL-REC" connector on the receiver-coder unit), the modulator output (from the modulator-transmitter "MONITOR" connector) and the transmitter output (from the monitor "CAVITY AMP" connector).

(2) To prepare the aural monitor for use, connect the monitoring cable between the output connector desired and the receiver-coder "SPKR. INPUT" connector.

(3) Place the "SPKR. LOCAL-EXT." switch to the "LOCAL" position.

(4) Adjust the "SPKR. VOLUME" control for the desired volume.

(5) An external, 500-ohm speaker may be installed at a remote position by connecting it to the right-hand line voltage control unit connector at the rear of that unit as explained in (6) below. The "SPKR. LOCAL-EXT" switch must then be thrown to the "EXT." position.

(6) When installing an external, remote speaker, open the lower air port on the back of the radio set cabinet.

(7) At the extreme right (when looking at the back of the cabinet is a four contact connector marked "EXTERNAL CONNECTIONS" with the letters A, B, C, and D moulded on the connector. A polarized four prong plug (AN 3108-18-10P) to fit this connector, also marked A, B, C and D, is provided and will be found in the spare parts Case, CY-248/CPN-8.

(8) Connect the wires from the external 500 ohm speaker to the prongs stamped "A" and "B" on the plug and insert the plug into the "EXTERNAL CONNECTION" connector.

(9) To provide a remote alarm bell circuit which will indicate that the high voltage of Radio Set AN/CPN-8 has been disconnected either because of trouble or on purpose, connect a circuit as described in step (10) following across prongs marked "C"

and "D" of the plug mentioned in step (7), and insert the plug into the "EXTERNAL CONNECTIONS" connector.

(10) The external, remote alarm bell or buzzer circuit must provide its own batteries, buzzer or bell, and a switch which may be opened when the equipment is purposely shut down. An internally contained relay in the high voltage circuit of Radio Set AN/CPN-8 places a short circuit across contacts "C" and "D" when the high voltage is OFF, thus ringing the alarm bell.

c. FINAL CHECK AND RECORDING.

Perform the coding adjustment described in section III, paragraph 2, and the "DAILY OPERATIONAL CHECK" described in section III, paragraph 2. Record the following:

(1) The assigned coding sequence. Example: "2-2-2.".....

(2) The "CODE ELEMENT" and "CODE SPACING" switch settings. Example: "6-S-L-S-L-S.".....

(3) The "D.C. KILOVOLTS" meter reading on its upper scale as read in the operation of paragraph 3b(3) section III..... 6.7 KV

(4) The "D.C. KILOVOLTS" meter reading on its lower scale as read in the operation of paragraph 3b(41) section III..... 20....

(5) The "D.C. KILOVOLTS" meter reading on its lower scale as read in the operation of paragraph 3b(42) section III.... 20.2.....

(6) The "TRANSMITTER TUNING" dial adjustment resulting from the operation of section III, paragraph 3b(44)..... 7

(7) The "TRANSMITTER TUNING" dial adjustment resulting from the operation of section III, paragraph 3b(47).... Max. Signal Amplitude on Scope

(8) The monitor panel meter reading resulting from the operation of section III, paragraph 3b(56). ..... In Red

SECTION III
OPERATION

Note

After Radio Set AN/CPN-8 has been installed and adjusted as described in Section II, it is only necessary to apply the following starting, stopping and code setting procedures to operate it. Since the beacon is entirely automatic, operation consists of a series of checks and inspections to insure peak performance and continuous duty.

1. TO START AND STOP THE EQUIPMENT.

a. TO START OPERATION.

(1) Make sure that all switches marked "ON-OFF" are in the "OFF" position.

(2) Make certain that the rear door is in place and that the air intake and exhaust doors are open.

(3) Turn the "LINE VOLTAGE" wheel on the voltage control unit completely counterclockwise.

(4) Throw the modulator-transmitter "FILAMENT POWER" switch to the "ON" position.

(5) Rotate the "LINE VOLTAGE" wheel clockwise until the modulator-transmitter "A.C. VOLTS" meter reads "115" (volts).

(6) Allow three minutes for the equipment to warm up.

CAUTION

If the radio set has not been in operation for 24 hours or longer, wait 30 minutes to an hour for the equipment to warm up.

(7) Meanwhile, set the "CODE ELEMENT" switch and the "CODE SPACING" switches for the assigned coding sequence as outlined in paragraph 2, this section.

(8) Throw the modulator-transmitter "PLATE POWER" switch to the "ON" position.

(9) The radio set should now be in full operation.

Note

The above procedure should be followed by the "DAILY OPERATIONAL CHECK" described in paragraph 2, this section.

b. TO STOP OPERATION.

(1) Throw the "PLATE POWER" switch, then the "FILAMENT POWER" switch to the "OFF" position.

(2) The radio set should now be completely inoperative.

Note

During humid conditions it is well to place the radio set in "STAND-BY" operation as outlined below.

c. TO TURN ON THE EQUIPMENT FOR STAND-BY OPERATION:—(This is to protect the equipment against moisture and fungus.)

(1) Place the "PLATE POWER" switch in the "OFF" position.

(2) Place the monitor "RF" switch in the "OFF" position.

(3) Place the monitor "POWER" switch in the "ON" position.

(4) Place the "FILAMENT POWER" switch in the "OFF" position.

(5) Open the left-hand access door in the voltage control unit and remove the blower motor fuse. CLOSE THE ACCESS DOOR! STORE THE FUSE IN THE ANTENNA CASE!

(6) Place the "FILAMENT POWER" switch in the "ON" position.

(7) Turn the "LINE VOLTAGE" wheel counter-clockwise until the "A-C VOLTS" meter reads "100" (volts). If the relays chatter at this voltage, turn the "LINE VOLTAGE" wheel clockwise until the relay chatter just stops.

d. TO TURN ON THE EQUIPMENT FROM STAND-BY OPERATION.

(1) Turn the equipment off as described in paragraph 1b, this section.

(2) Replace the blower motor fuse.

(3) Turn on the equipment as described in paragraph 1a, this section.

2. TO SET UP A SPECIFIED CODING SEQUENCE.

a. Turn the receiver-coder "CODE ELEMENT" switch to the number corresponding to the number of code signals in the assigned code. Examples: A "2-2-1" code is specified. Turn the switch to position "5". A 1-2-3 code is assigned. Turn the switch to position "6". Code "1-1-2-1" would call for position "5". Adjust the spacing between signals, so as to form the assigned groups, by means of the "CODE SPACING" switches.

b. These switches, reading left to right, control the following spaces:—

(1) The space between the first and second signal.

(2) The space between the second and third signal.

(3) The space between the third and fourth signal.

(4) The space between the fourth and fifth signal.

(5) The space between the fifth and sixth signals. In the "L" position, the spacing will be long and this is always the spacing between code groups. In the "S" position, the spacing will be short, and is the spacing between signals of a code group. A series of signals or signal groups is a code sequence.

Examples:—To set up a 2-2-2 sequence. The "CODE ELEMENT" switch will be placed at position "6". The first two signals form a group, so the left-hand switch is placed at the "S" position. The second and third signals must be spaced to form the first group, so the next "CODE SPACING" switch will be placed at the "L" position. Since the fourth signal is part of the second group, the next spacing switch must be placed at the "S" position to form the second group and switch number four (fourth from the left) is placed at the "L" position to separate the second and third code group. The last, or right-hand spacing switch is now placed at "S" so that the sixth signal will be spaced as a part of the third group. If this switch were placed at "L" position, the result would be a "2-2-1-1" code sequence.

3. DAILY OPERATIONAL CHECK.

a. GENERAL.—In order to make the daily operational check, it is assumed that the radio set has been adjusted as described in section II and placed in operation as described in paragraphs 1 and 2, this section.

b. PROCEDURE.

(1) Check that the red and green lights on the modulator-transmitter panel are illuminated.

(2) Make sure that the line voltage is set at "115" (volts) on the modulator-transmitter "A-C VOLTS" meter.

(3) Place the modulator-transmitter "METER SELECTOR" switch to the "HIGH VOLTAGE" position and note the meter reading, which should be between "6" and "7" (Kilovolts) on the upper scale of the "D.C. KILOVOLTS" meter, or as recorded previously in section II, paragraph 5(c) (3).

(4) Check the red pilot light on the receiver-coder unit and see that it is illuminated.

(5) Place the monitor "R-F" switch in the "OFF" position.

(6) Place the monitor "POWER" switch in the "ON" position.

(7) Turn the monitor "SWEEP SELECTOR" switch to position "1".

(8) Turn the monitor "REPETITION RATE" switch to the "1600" position.

(9) Adjust the "HORIZ. CENTERING", "VERT. CENTERING", "FOCUS" and "INTENSITY" controls on the monitor panel for a clear bright, centered trace on the CRT screen.

(10) Turn the monitor "CALIBRATE" switch to the "ON" position.

(11) Adjust the monitor "SWEEP EXPANDER" and "HORIZ. CENTERING" controls to obtain a calibration pip spacing of exactly ten small CRT scale divisions.

(12) Turn the "CALIBRATE" switch to the "OFF" position.

(13) Turn the monitor "THERM. SW." knob to the "SIG. GEN." position.

(14) Turn the monitor "PULSE-CW" switch to the "CW" position.

(15) Adjust the monitor "THERMISTOR ZERO SET" knob for a monitor panel meter reading of "0".

(16) Depress and hold down the monitor "SHUNT" button, meanwhile adjust the "THERMISTOR ZERO SET" knob again for a meter reading of "0".

(17) Turn the monitor "ATTENUATION" dial until "60" appears under the index.

(18) Place the "R-F" switch in the "ON" position.

(19) Turn the monitor "FREQUENCY" knob so that its index points to the white panel index at the bottom of the panel.

(20) Depress and hold down the "SHUNT" button and, at the same time, adjust the monitor "R-F OUTPUT" control until the panel meter reads "100".

(21) Release the "SHUNT" button.

(22) Turn the "PULSE-CW" switch to the "PULSE" position.

(23) Connect the receiver-code "REC.-VISUAL" connector to the monitor "VIDEO INPUT" connector by means of the monitoring cable supplied with the equipment.

(24) Only a "noise" signal or "grass" on the baseline should be visible on the CRT screen, with an occasional "flicker" if the beacon should be interrogated.

(25) Adjust the celluloid CRT scale, if necessary, so that the horizontal lines are parallel with the baseline on the screen of the tube.

(26) Adjust the "ATTENUATION" dial until a signal five small scale divisions high appears on the screen as shown in figure 3-1.

(27) Adjust the "PULSE WIDTH-FINE-COARSE" controls to obtain a pulse identical with figure 3-1 on the CRT screen.

(28) Adjust the "ATTENUATION" dial to produce a signal identical to figure 3-2 on the CRT screen.

(29) The "ATTENUATION" dial reading should be "36" or HIGHER.

(30) Connect the monitoring cable between "VIDEO INPUT" and the receiver-coder "DISCRIM" connectors.

(31) The signal should appear as shown in figure 3-3.

(32) Slowly rotate the "ATTENUATION" dial clockwise to "0" and observe the CRT screen all the while. The signal should change to that shown in figure 3-4 after a rotation of two or three dial divisions. Further rotation toward "0" should have no other effect. If the signal changes back to that shown in figure 3-3 the discriminator is improperly adjusted. Refer to section II, paragraph 2b(4) for instructions on adjusting the discriminator.

IMPORTANT

There may be some flickering caused by interrogation. This is normal and must not cause confusion. MAKE THE ABOVE OBSERVATIONS CAREFULLY!

(33) Turn the "ATTENUATION" dial to "30".

(34) Connect the monitoring cable between "VIDEO INPUT" and the receiver-coder "CODER" connectors.

(35) Turn the monitor "SWEEP SELECTOR" switch to the "3" position.

(36) Adjust the "VERT. CENTERING", "HORIZ. CENTERING", "FOCUS" and "INTENSITY" controls for a clear, bright centered trace.

(37) Observe the signal and check the code pattern to see that it conforms with the code assigned. IF IT IS NOT CORRECT, CHANGE IT IMMEDIATELY SO THAT IT DOES CONFORM!

(38) Connect the monitoring cable between "VIDEO INPUT" and the modulator-transmitter "MONITOR" connectors.

(39) Again observe the signal. The code pattern should conform with the code assigned.

(40) Check all code signals. They should all be of equal brilliance. If fading occurs on any of the code signals, refer to the maintenance manual for detailed information regarding correction of this fault.

(41) Turn the modulator-transmitter "METER SELECTOR" switch to the "TRANSMITTER CURRENT" position. The "D.C. KILOVOLTS" meter should read approximately "20" on its lower scale or the same as the data recorded from the operation in section II, paragraph 5(c) (4).

IMPORTANT

The meter may fluctuate rapidly because of interrogation. If this is the case, ESTIMATE THE AVERAGE OF THE FLUCTUATIONS FOR A READING.

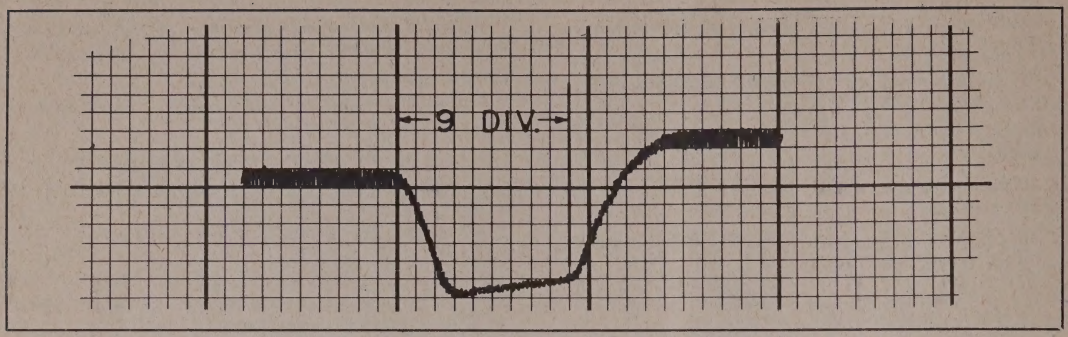


Figure 3-1. Waveform of Receiver Signal for Pulse Width Adjustment

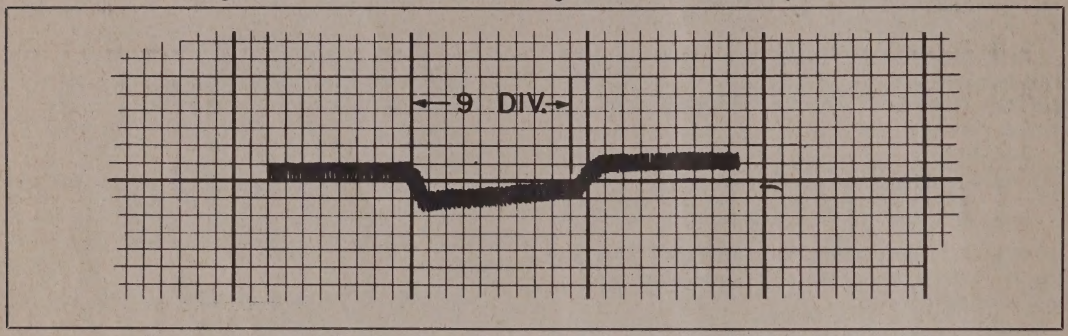


Figure 3-2. Waveform of Receiver Pulse — Tangential Signal

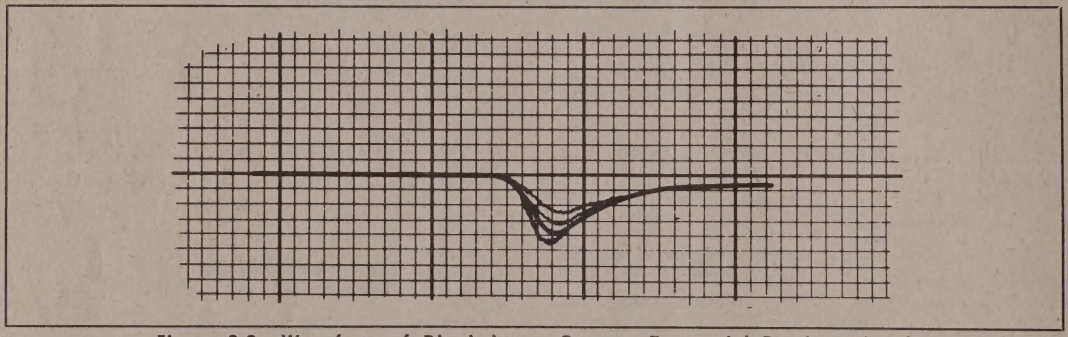


Figure 3-3. Waveform of Discriminator Output — Tangential Receiver Signal

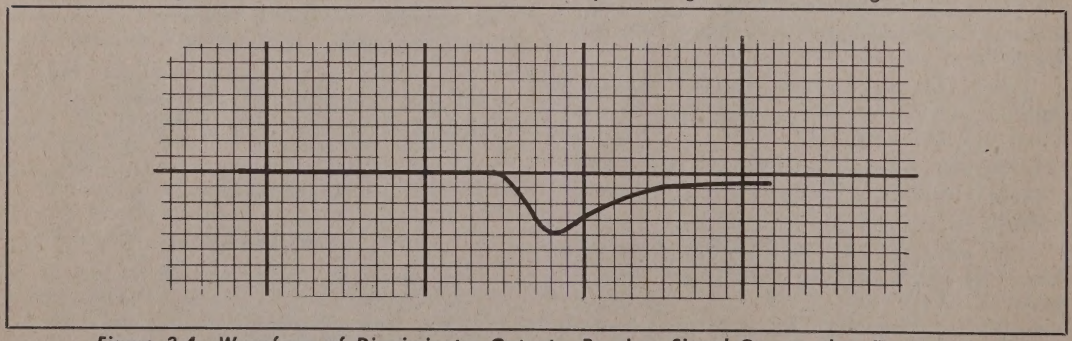


Figure 3-4. Waveform of Discriminator Output — Receiver Signal Greater than Tangential

(42) Turn the "METER SELECTOR" switch to the "MODULATOR CURRENT" position: The "D.C. KILOVOLTS" meter reading should be between "20" and "25" (milliamperes) on the lower scale or correspond to recorded data taken in section II, paragraph 5(c) (5). If the reading is considerably above normal, CLOSE THE EQUIPMENT DOWN IMMEDIATELY as described in section III, paragraph 1b and notify responsible maintenance personnel.

(43) Connect the monitoring cable between the "VIDEO INPUT" and the monitor "CAVITY AMP" connectors. The transmitter output should be visible on the CRT screen.

(44) Unlock the modulator-transmitter "TRANSMITTER TUNING" dial and adjust the dial for maximum signal amplitude on the CRT screen.

(45) Note the dial reading. This should correspond to the recorded data taken in section II, paragraph 5(c) (6).

(46) Turn the "REPETITION RATE" switch to the "800" position.

(47) Readjust the "TRANSMITTER TUNING" dial for maximum signal amplitude on the CRT screen.

(48) Note the "TRANSMITTER TUNING" dial reading. This should correspond to the recorded data taken in section II, paragraph 5(c) (7). If the difference between readings is less than three small dial divisions, the dial should be set midway between the two readings. If the difference is greater, it indicates trouble with the transmitting tube or the presence of "LONG LINES EFFECT". Refer to the maintenance manual for details on correcting these troubles.

(49) CAREFULLY LOCK THE "TRANSMITTER TUNING" DIAL WITHOUT DISTURBING THE DIAL SETTING!

(50) Turn the "REPETITION RATE" switch to the "1600" position.

(51) Place the "R-F" switch in the "OFF" position.

(52) Turn the "THERM. SW" knob to the "TRANS" position.

(53) Adjust the "THERMISTOR ZERO SET" knob to obtain a meter reading of "0".

(54) Depress and hold down the "SHUNT" button and at the same time adjust the "THERMISTOR ZERO SET" knob for a meter reading of "0".

(55) Place the "R-F" switch in the "ON" position.

(56) Depress the "SHUNT" button and note the meter reading. It should read somewhere in the red area on the meter dial or according to recorded data taken in section II, paragraph 5(c) (8). If the set is being interrogated, the results will be somewhat inaccurate.

(57) Place the "R-F" switch in the "OFF" position.

(58) Place the monitor "POWER" switch in the "OFF" position.

(59) Check if the line voltage is "115" (volts). Make adjustment if needed.

(60) Close the front door of the cabinet.

SECTION IV
EMERGENCY REPAIR

1. R-F PLUMBING REPAIRS.—Small holes or leaks in the r-f lines may be repaired by soldering.

a. Sandpaper the paint off of the area surrounding the leak.

b. Coat the surface of the line with NON-CORROSIVE flux such as rosin dissolved in alcohol.

c. Apply a hot soldering iron to the surface, and touch a piece of solder to the leak. *USE SOLDER SPARINGLY!*

d. Skid the iron slowly back and forth over the melted solder to smooth it out.

e. Allow the line to cool and then pressure test it as described in section II.

2. FUSE REPLACEMENT.

A list of all fuses and their location is given below as an aid to replacement. All spare fuses are contained in the spare parts kit. (In later models, a holder for spare fuses will be found inside one of the access doors on the Voltage Control Unit.) A fuse puller (see fig. 5-8) is clamped to the inside of the voltage control unit right-hand service panel to aid in removing the main power fuses.

CAUTION

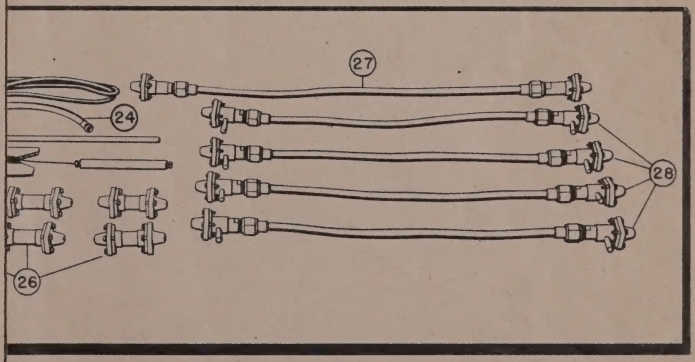
PLACE ALL SWITCHES MARKED "ON-OFF" IN THE "OFF" POSITION AND DISCONNECT THE POWER CABLE FROM THE RADIO SET CABINET BEFORE CHANGING FUSES!

Location	*Quantity*	*Type*	*Size (Amps.)*	*Panel Nomenclature*
Monitor Panel	1	3AG	1	"H.V. 1 Amp."
Monitor Panel	1	3AG	3	"L.V. 3 Amp."
Receiver Panel	1	3AG	5	"5A."
Mod-Trans. Panel	1	3AG	2	"Fil. 2 Amp."
Mod-Trans. Panel	1	3AG	2	"L.V. 2 Amp."
Mod-Trans. Panel	1	3AG	1	"H.V. Fil. 1 Amp."
Mod-Trans. Panel	1	3AG	6	"H.V. 6 Amp."
Mod-Trans. Panel	1	3AG	1	"Trans. Fil. 1 Amp."
Mod-Trans. Panel	1	3AG	2	"Blower 2 Amp."
V. Control Unit (Behind left panel door)	1	3AG	3	"Blower Fuse 3 Amp."
V. Control Unit (Behind right panel door)	2	Cartridge	20	"115 V. 20 Amp."
V. Control Unit (Behind right panel door)	1	Cartridge	10	"230 V. 10 Amp."

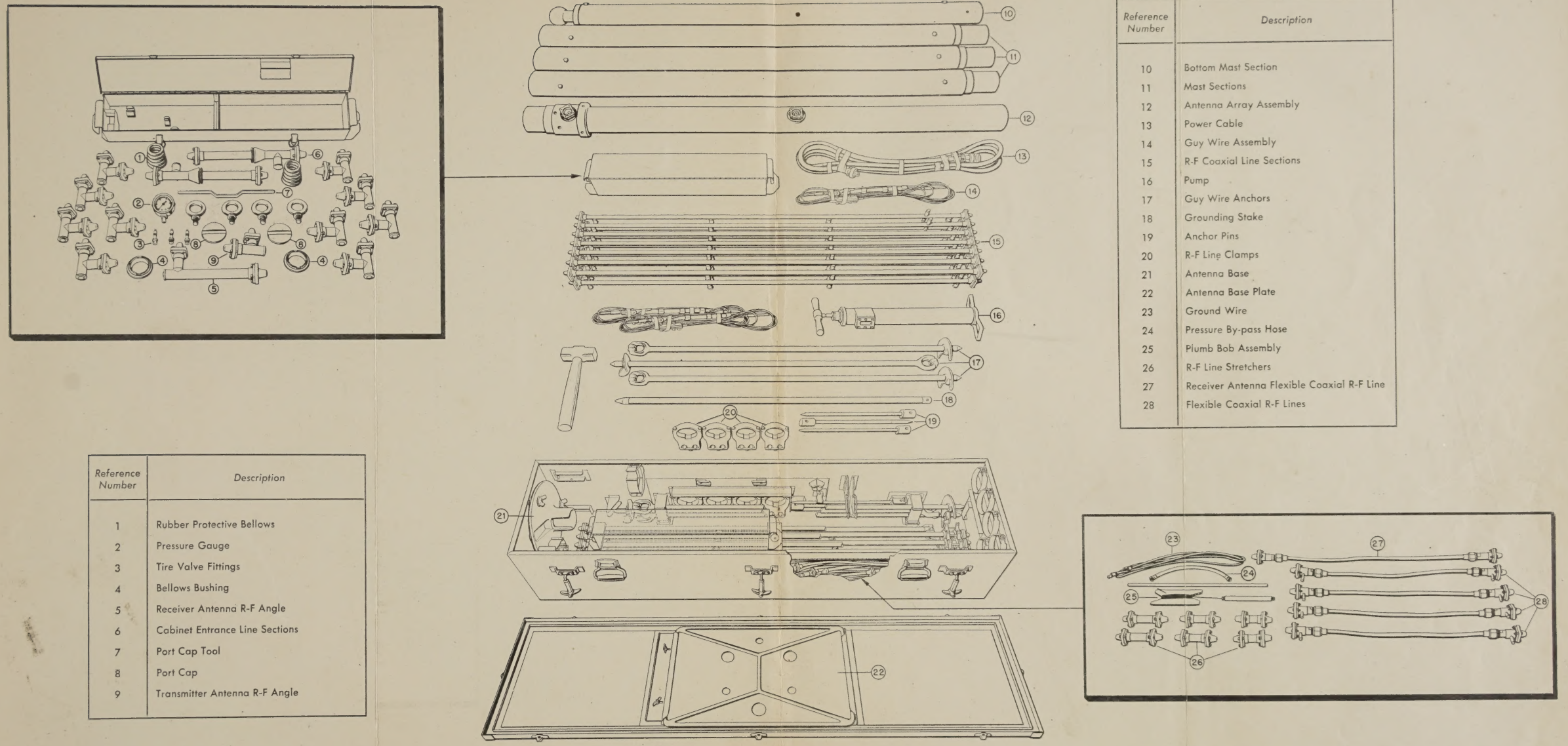
SECTION V

DRAWINGS

Description
Bottom Mast Section
Mast Sections
Antenna Array Assembly
Power Cable
Guy Wire Assembly
R-F Coaxial Line Sections
Pump
Guy Wire Anchors
Grounding Stake
Anchor Pins
R-F Line Clamps
Antenna Base
Antenna Base Plate
Ground Wire
Pressure By-pass Hose
Plumb Bob Assembly
R-F Line Stretchers
Receiver Antenna Flexible Coaxial R-F Line
Flexible Coaxial R-F Lines



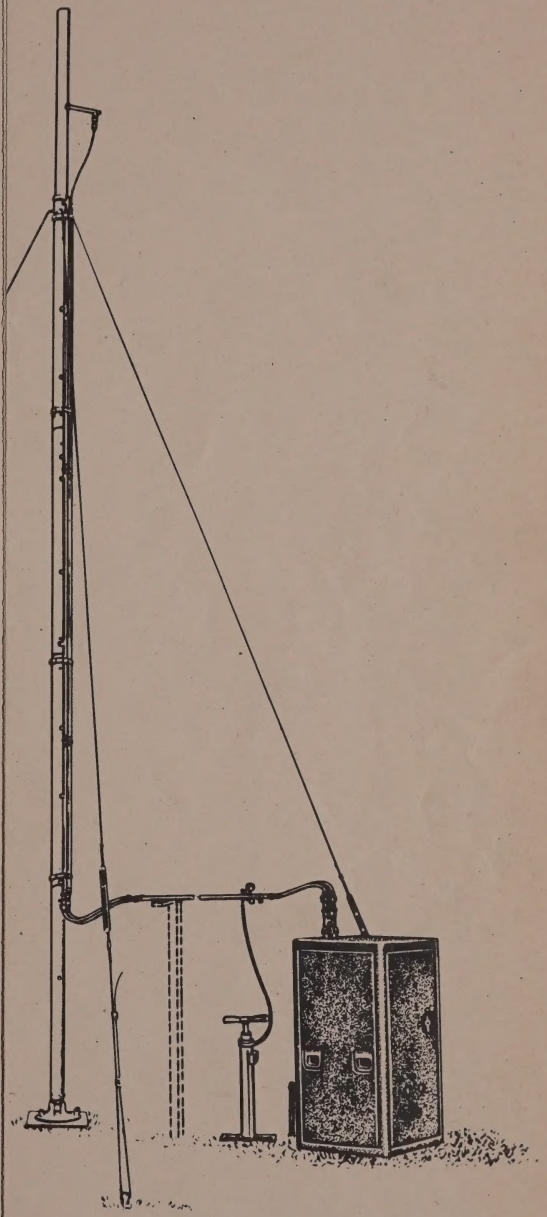
Antenna Case CY-166/CPN-8 and Contents



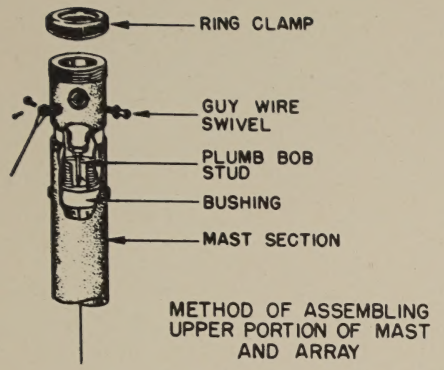
Reference Number	Description
1	Rubber Protective Bellows
2	Pressure Gauge
3	Tire Valve Fittings
4	Bellows Bushing
5	Receiver Antenna R-F Angle
6	Cabinet Entrance Line Sections
7	Port Cap Tool
8	Port Cap
9	Transmitter Antenna R-F Angle

Reference Number	Description
10	Bottom Mast Section
11	Mast Sections
12	Antenna Array Assembly
13	Power Cable
14	Guy Wire Assembly
15	R-F Coaxial Line Sections
16	Pump
17	Guy Wire Anchors
18	Grounding Stake
19	Anchor Pins
20	R-F Line Clamps
21	Antenna Base
22	Antenna Base Plate
23	Ground Wire
24	Pressure By-pass Hose
25	Plumb Bob Assembly
26	R-F Line Stretchers
27	Receiver Antenna Flexible Coaxial R-F Line
28	Flexible Coaxial R-F Lines

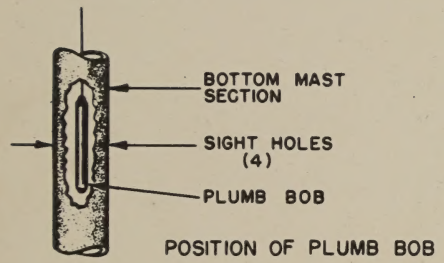
Figure 5-1. Antenna Case CY-166/CPN-8 and Contents



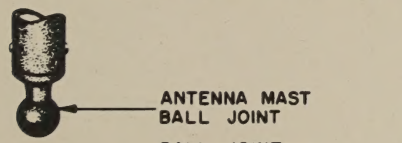
- Antenna Installation Diagram

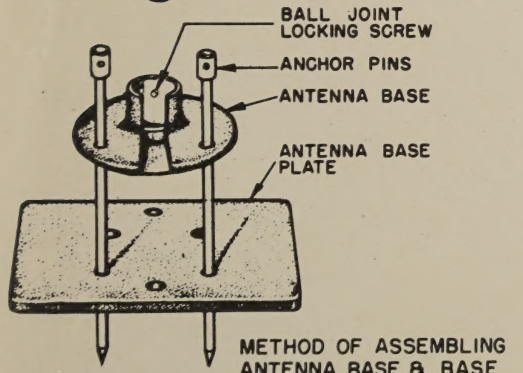


METHOD OF ASSEMBLING UPPER PORTION OF MAST AND ARRAY

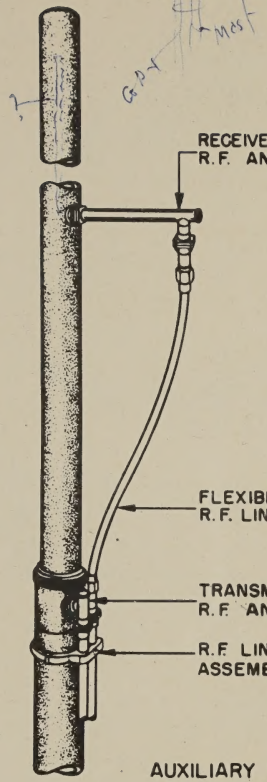


POSITION OF PLUMB BOB

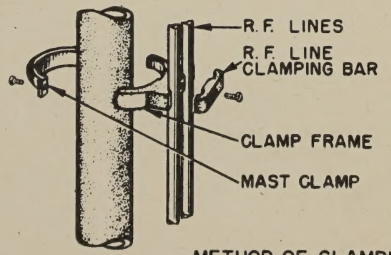




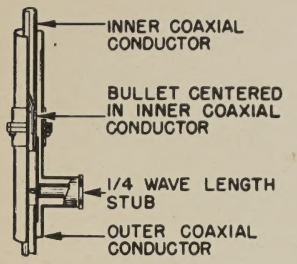
METHOD OF ASSEMBLING ANTENNA BASE & BASE PLATE



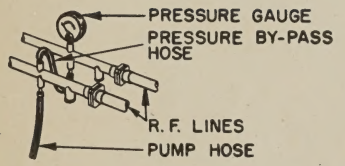
AUXILIARY VIEW OF MAST AND ARRAY SHOWING R.F. LINE FITTINGS



METHOD OF CLAMPING R.F. TRANSMISSION LINES



CORRECT METHOD OF ASSEMBLING R.F. LINE SECTIONS



PRESSURE GAUGE AND PUMP INSTALLATION

METHOD OF ASSEMBLING MAST SECTIONS

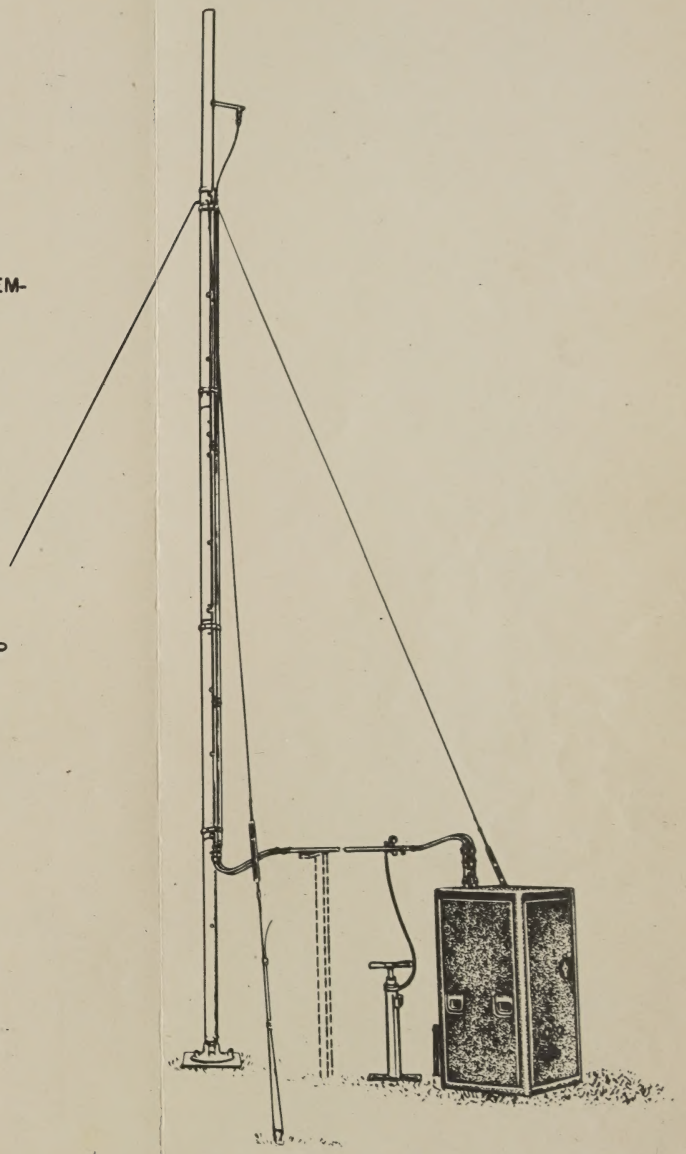
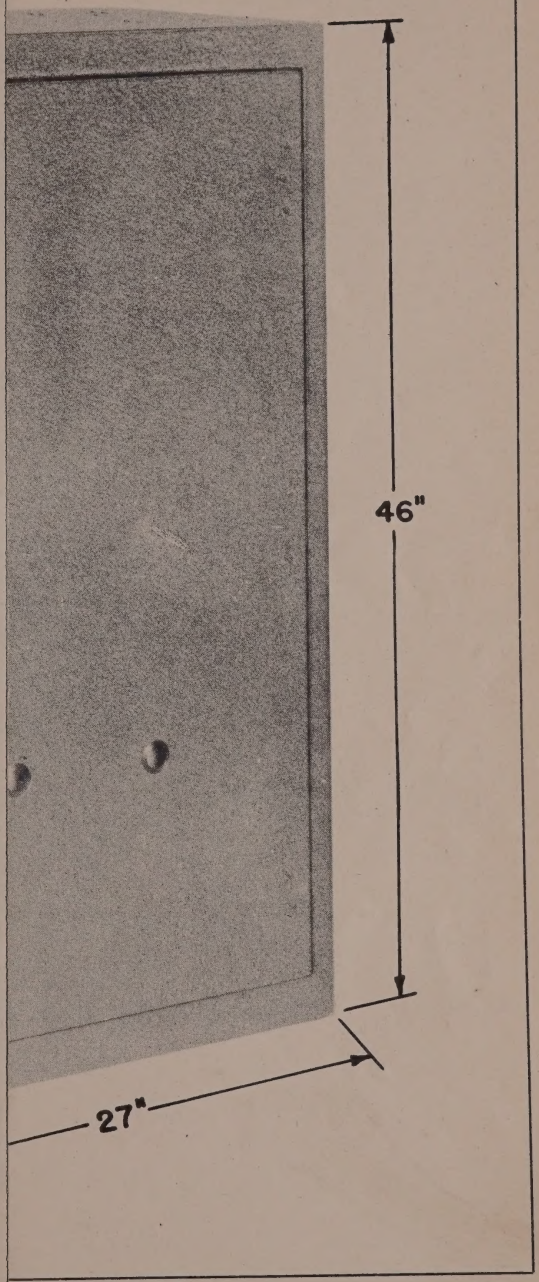


Figure 5-2. Radio Set AN/CPN-8 — Antenna Installation Diagram



-8 — *Dimensional Diagram*

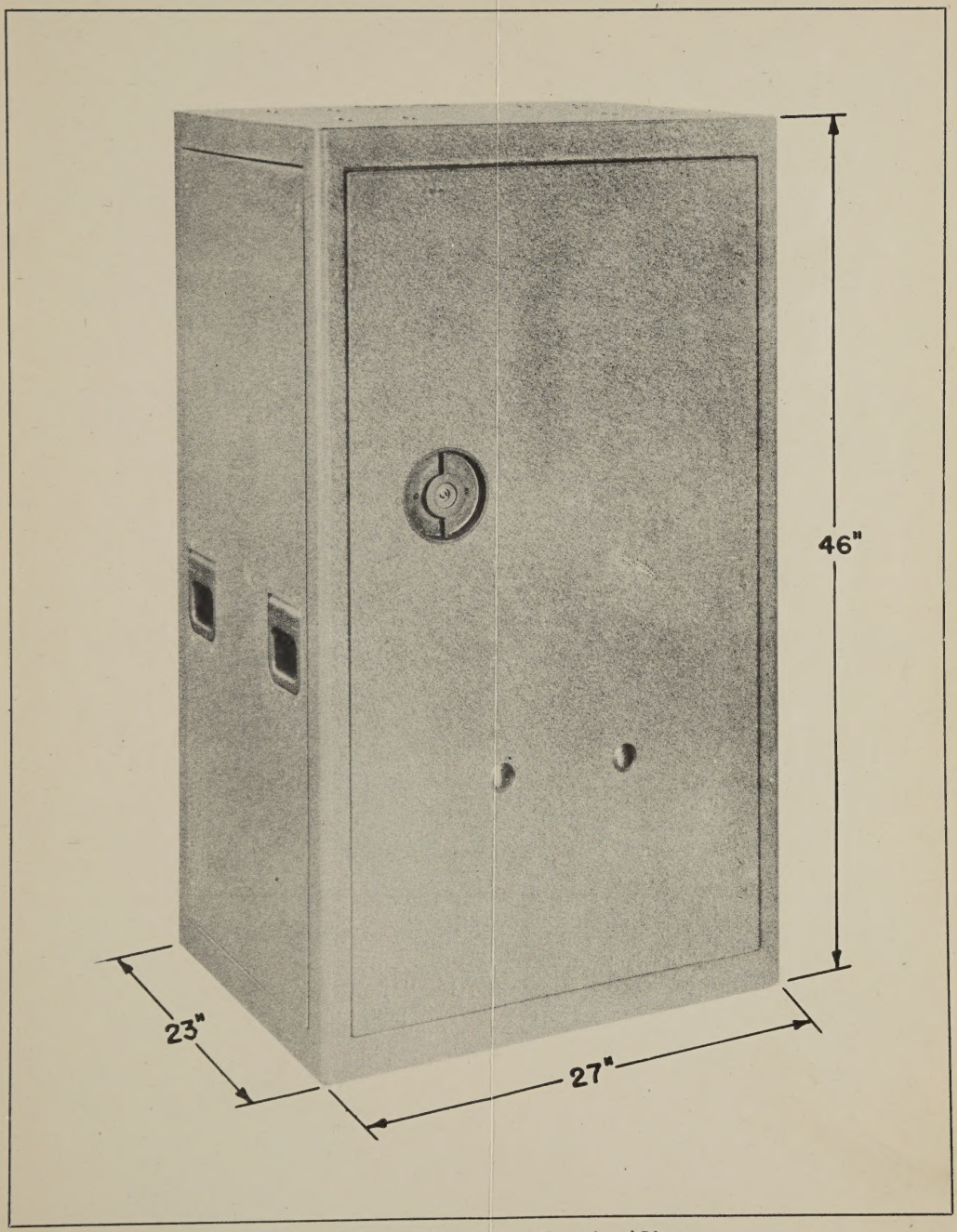
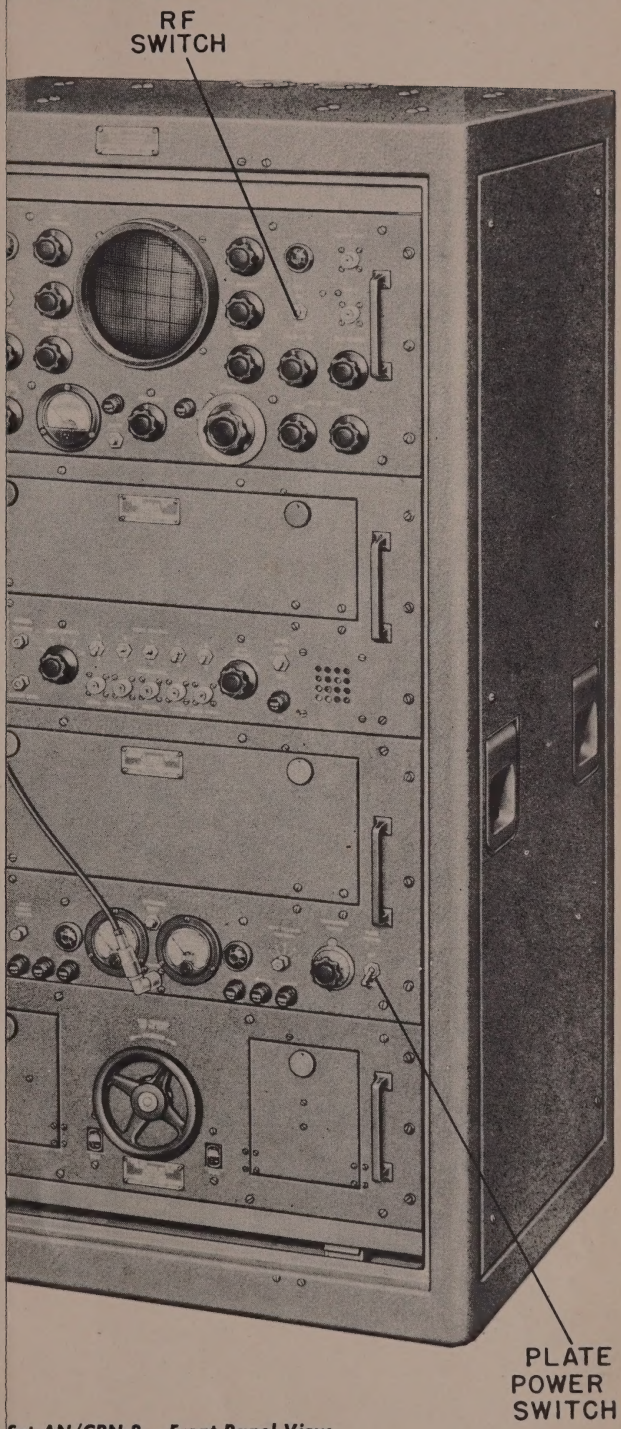


Figure 5-3. Case CY-68/CPN-8 — Dimensional Diagram



Set AN/CPN-8 — Front Panel View

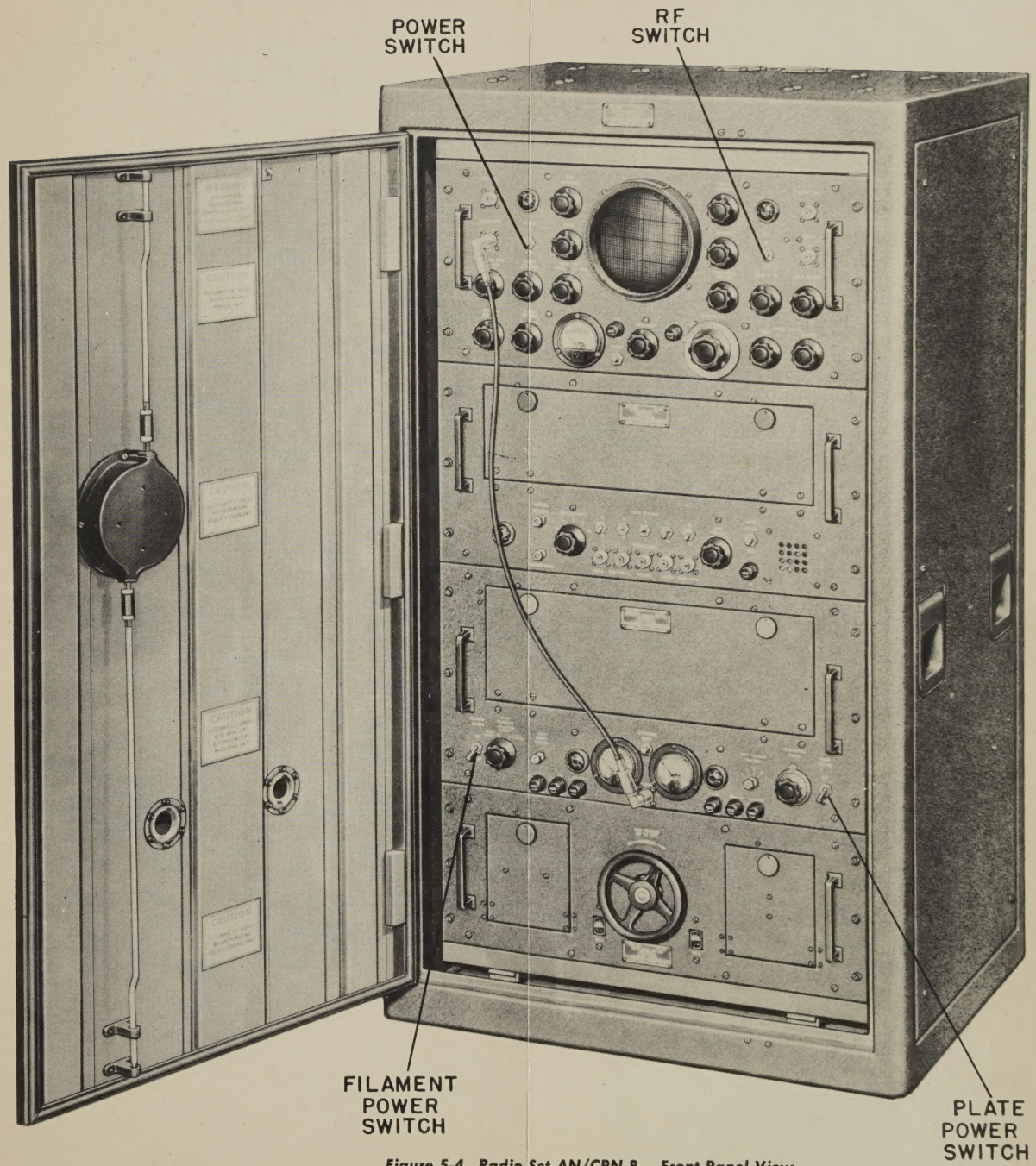


Figure 5-4. Radio Set AN/CPN-8 — Front Panel View

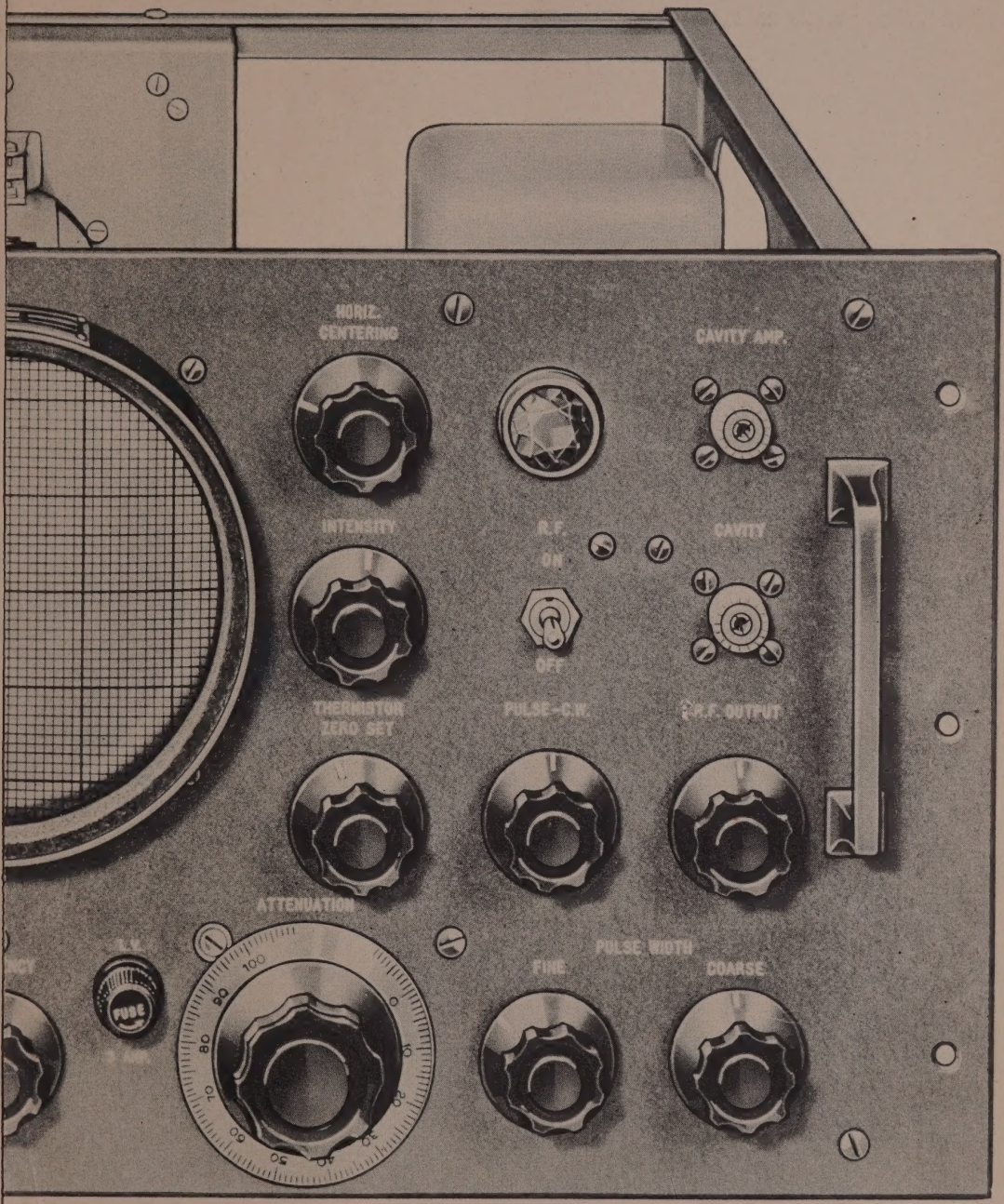


Figure 5-5. Monitor Unit TS-121/CPN-8 — Front View

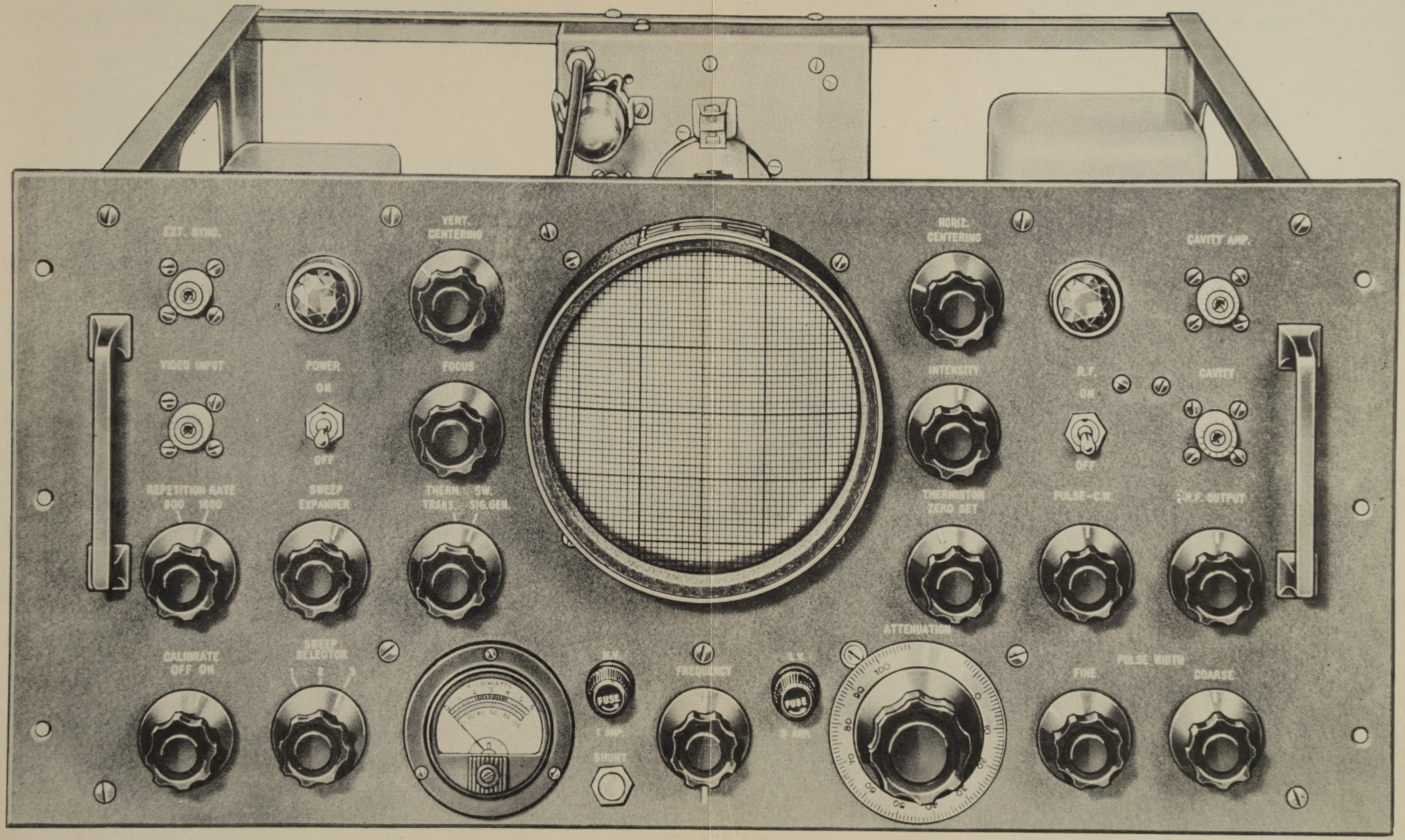


Figure 5-5. Monitor Unit TS-121/CPN-8 — Front View

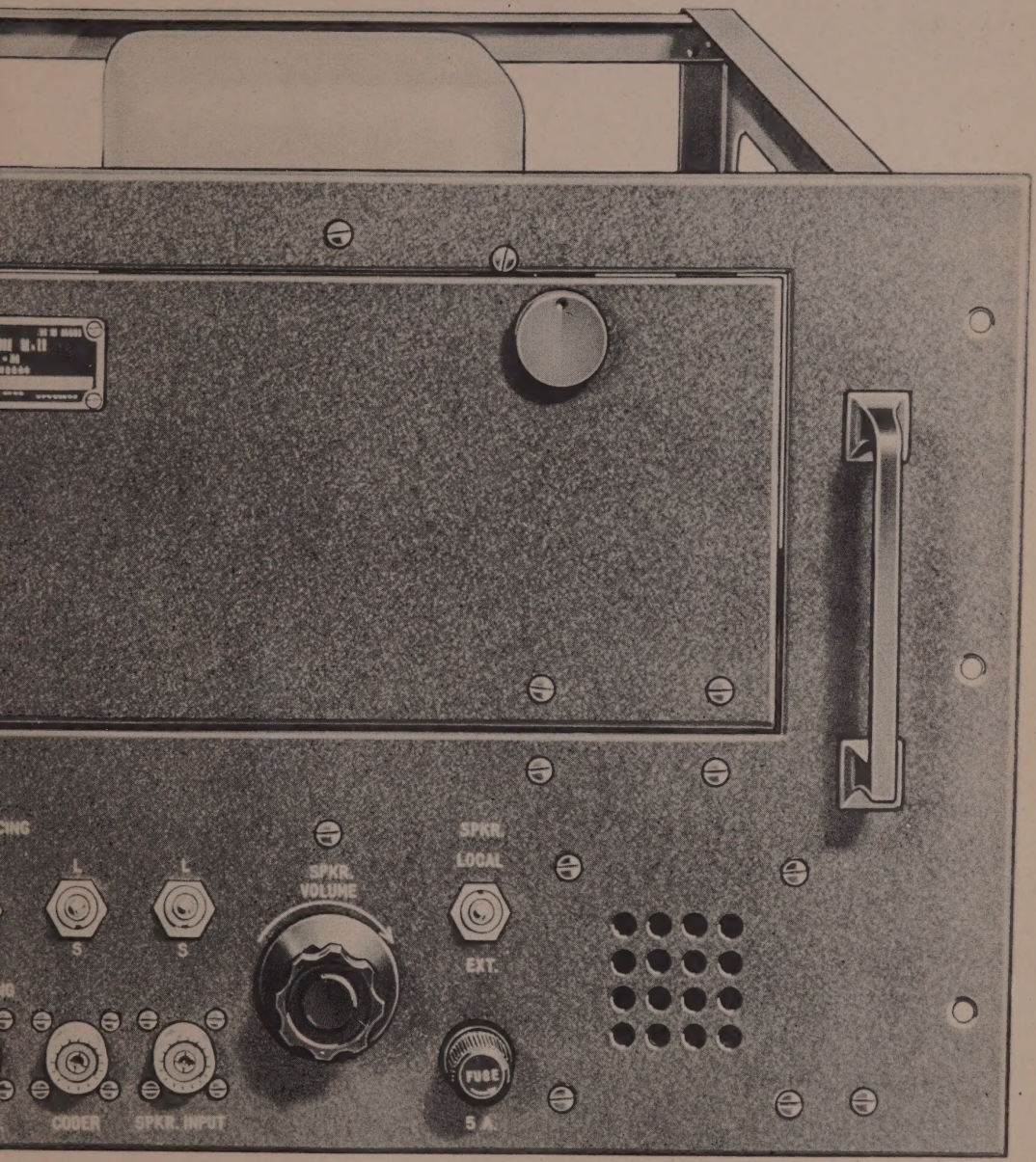


Figure 5-6. Receiver Coder Unit R-56/CPN-8 — Front View

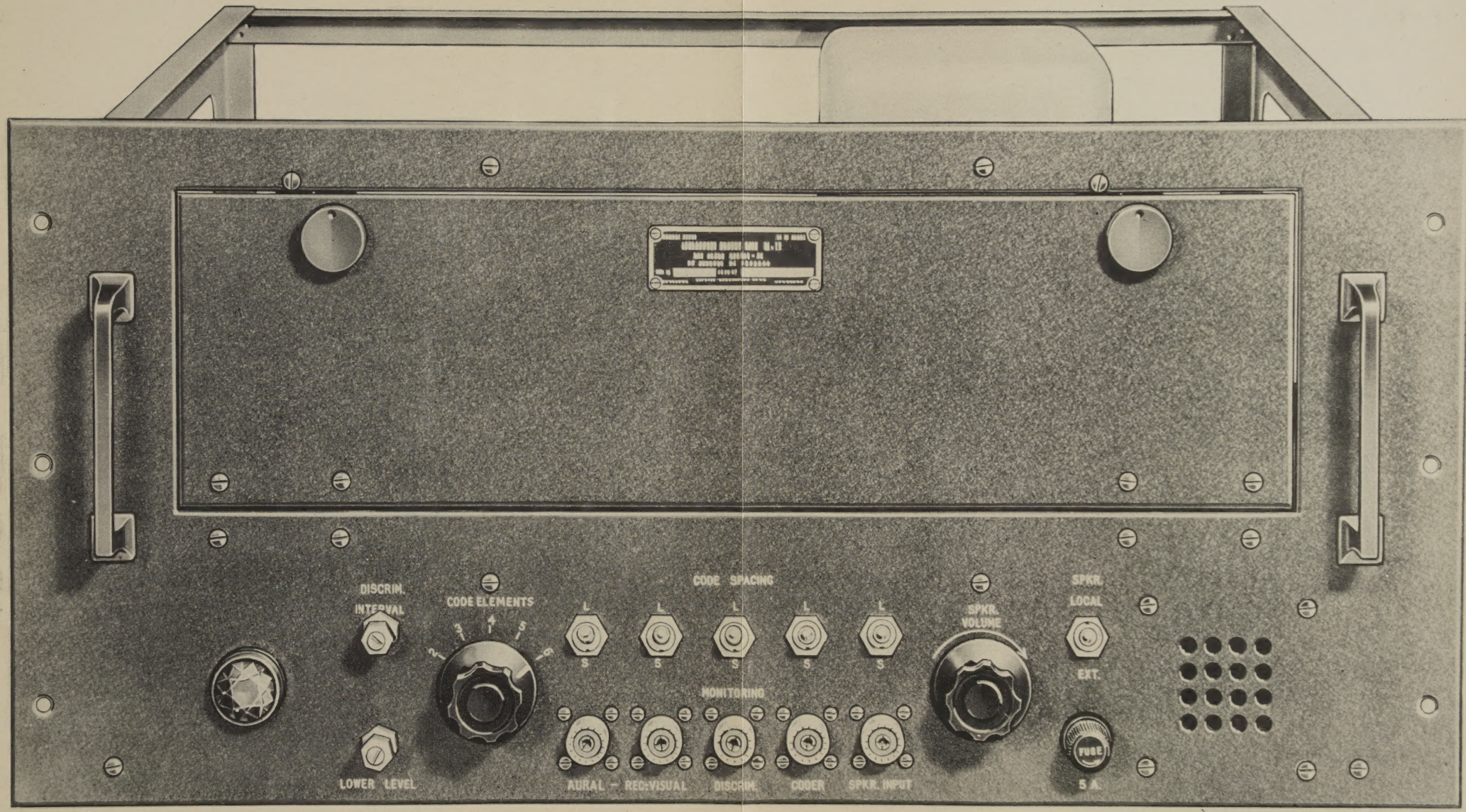


Figure 5-6. Receiver Coder Unit R-56/CPN-8 — Front View

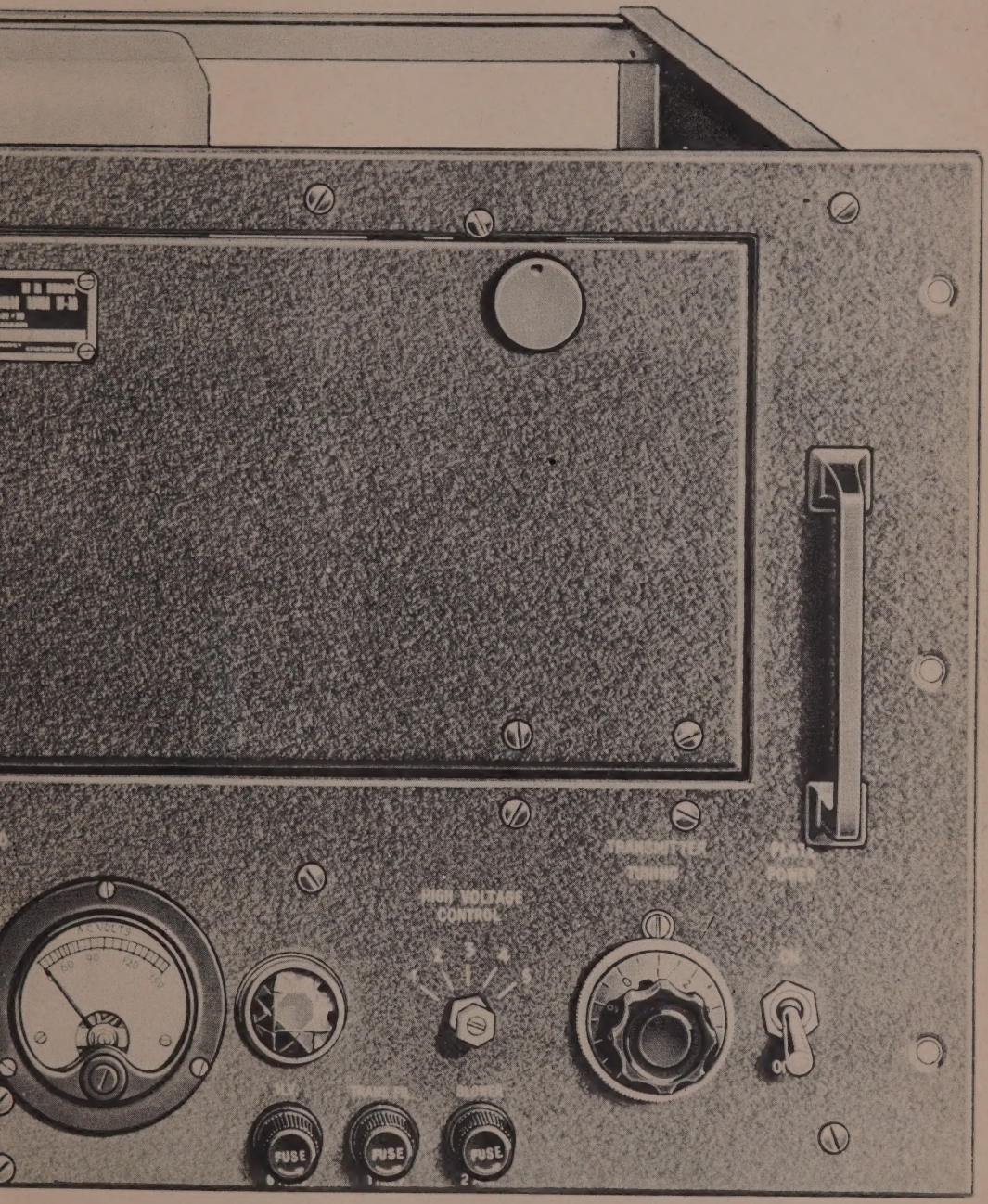


Figure 5-7. Transmitter — Modulator Unit T-50/CPN-8 — Front View

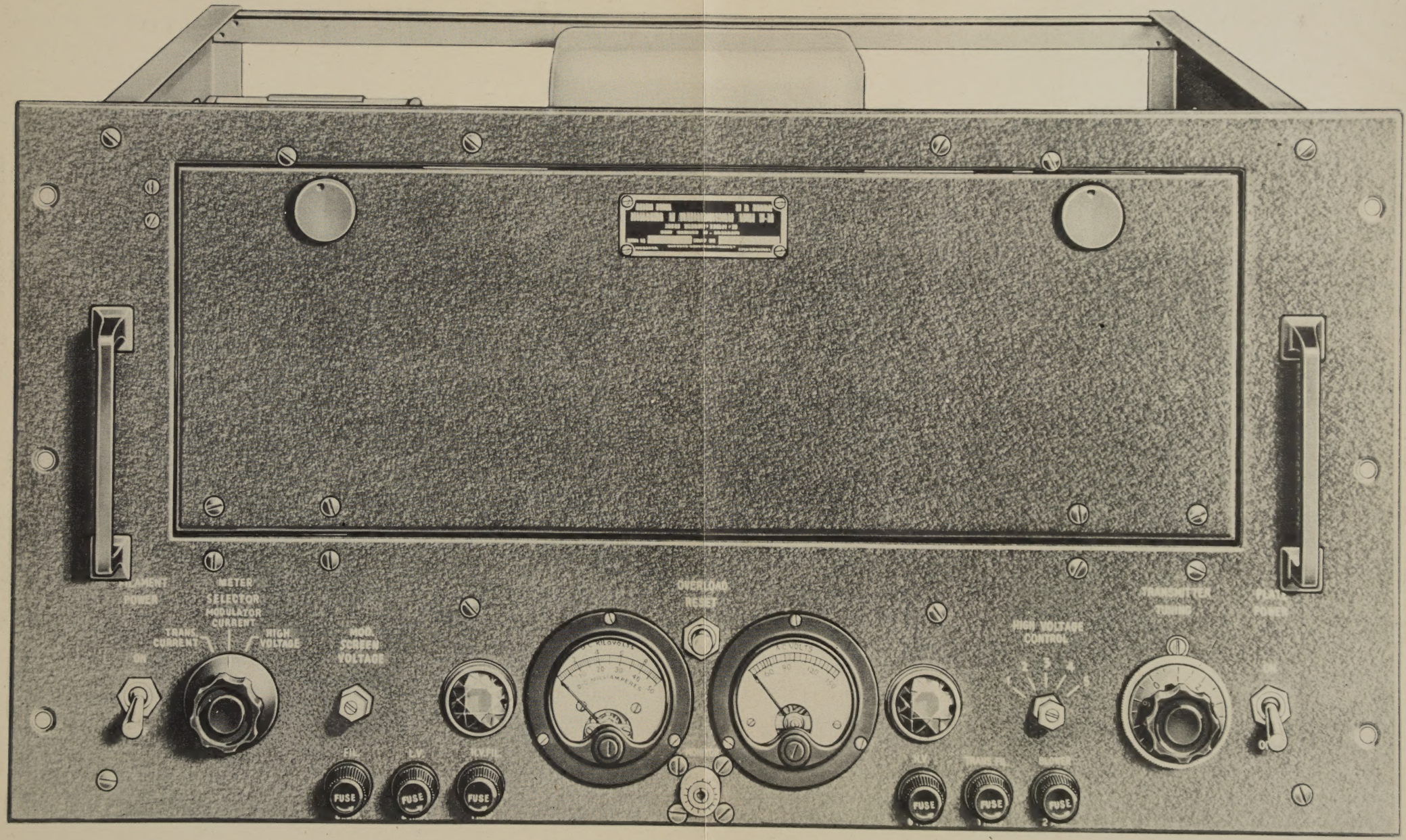
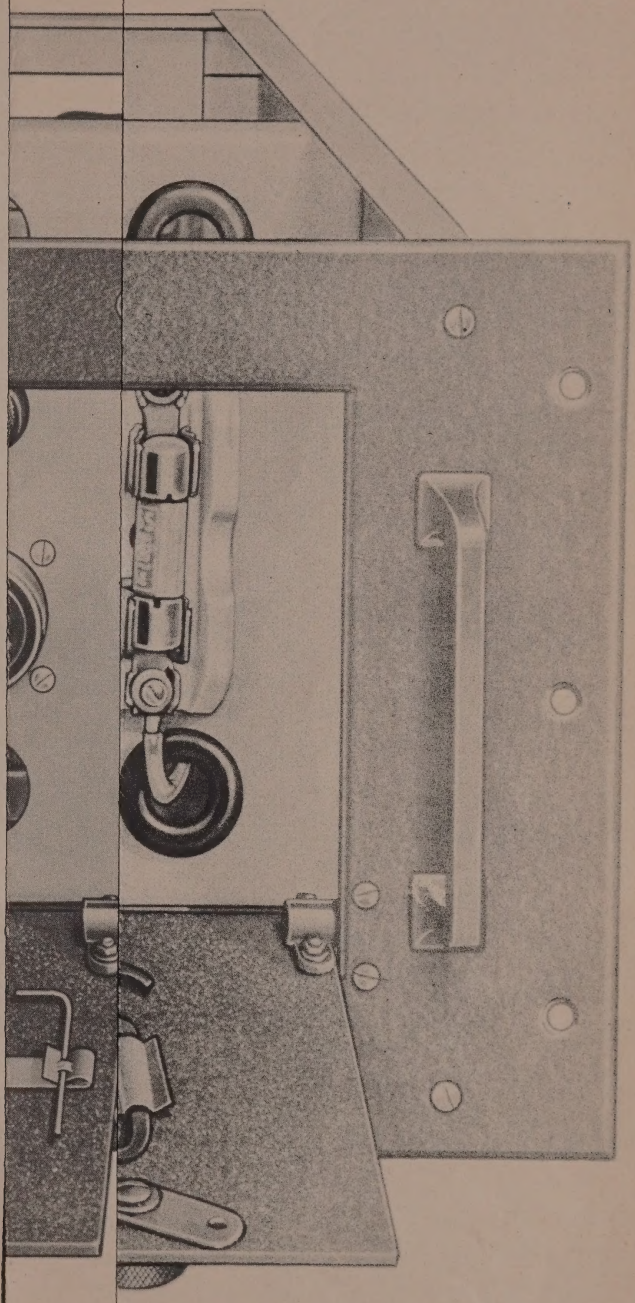


Figure 5-7. Transmitter — Modulator Unit T-50/CPN-8 — Front View



CN-11/CPN-8 — Front View

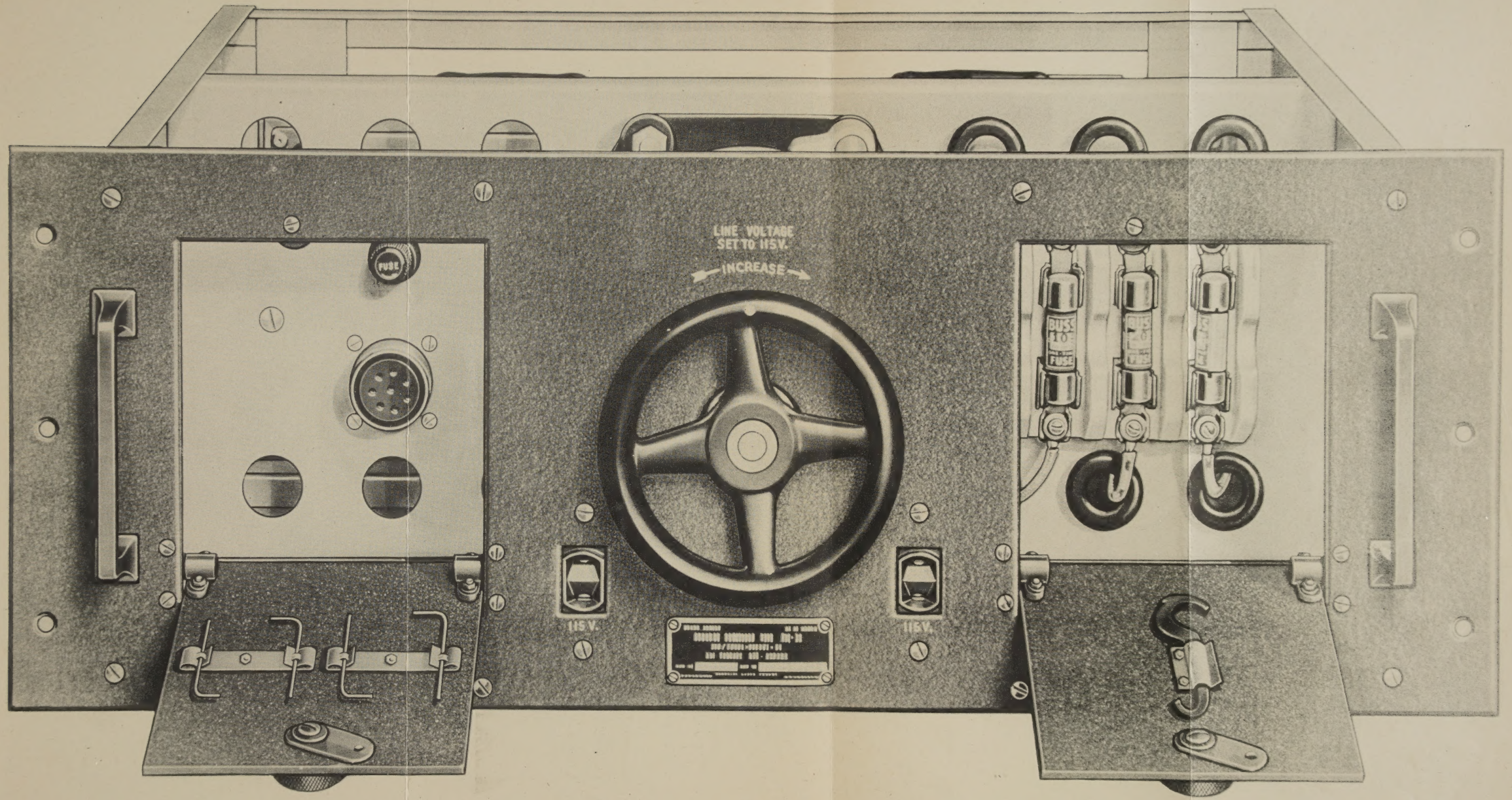


Figure 5-8. Voltage Control Unit CN-11/CPN-8 — Front View

17.56
30-11
47.67

100.00
47.67
53.33 Due
Tax
55.33